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CONTENT

HUMAN RESOURCES

Asymmetric Information in Labour Markets

Caner Özdurak
Yıldız Technical University

Traditional assessment of economic performance has been based upon traditional production factors such as land, labour and capital but the importance of the knowledge-based assets' role in firm's performance increase undeniably. Knowledge assets or intellectual capital may be mentioned as the "hidden" assets of a firm which is based on Human capital. According to this statement selection of the human resource becomes a much more important case that has to be achieved for firms and other agents.

The development of internet in 1990's has caused a kind of revolution in labour market which provides significant cost advantage forming a candidate pool. For a Human Resources Manager (HRM), choosing an appropriate candidate for the suitable position is just as difficult as to click his/her PC's mouse button. However, efficiency requires all labour forces to be employed under the assumption that the supplier (candidate) knows the true quality of him/herself whereas the HRMs (dealer) are unable to find the true quality of a specific candidate and adverse selection effect may cause the labour market to collapse entirely.

My paper is trying to introduce these selection process problems by combining different methods, Lemon Markets, Bayesian Signalling Games, Moral Hazard, Adverse Selection and Principal-Agent problems. The term lemon will refer to the candidates who apply for any kind of job while the interviews form the signals between the candidate (sender) and the HRMs (receptor). Using these tools, the paper is basing all these microeconomic problems on factors such as immigration and/or gender. Although Akerlof showed that informational asymmetries can cause adverse selection on markets. Inspiring by Spence's theory under certain conditions, well informed job applicants can improve their probability of taking the job by signalling their private information to poorly informed HRMs.

In the first part of the paper, I will give a very brief explanation about theoretical background of these tools and establish the link between those theoretical explanations and candidate selection process. In this framework, the labour force is dividing into two group: one group belongs to the well educated-white/blue collar labour force and the other group belongs to unskilled-ordinary labour force. This distinction helps us to interpret the signals from our model much more correctly.

Second part of the paper includes information about the selection and the real Human Resources Management examples. In this context, this part gives different selection problem cases. For instance, those inefficient choice techniques usually find the right CVs but wrong person. So choosing the good lemon among the others becomes more and more difficult when HRMs look at the wrong basket. Finally the last part gives a summary.

Introduction

Traditional assessment of economic performance has been based upon traditional production factors such as land, labor and capital but the importance of the knowledge-based assets' role in firm's performance increase undeniably. Knowledge assets or intellectual capital may be mentioned as the "hidden" assets of a firm which is based on Human capital. According to this statement selection of the human resource becomes a much more important case that has to be achieved for firms and other agents.

The development of internet in 1990's has caused a kind of revolution in labor market which provides significant cost advantage forming a candidate pool. For a Human Resources Manager (HRM), choosing an appropriate candidate for the suitable position is just as difficult as to click his/her PC's mouse button. However, efficiency requires all labor forces to be employed under the assumption that the supplier (candidate) knows the true quality of him/herself whereas the HRMs (dealer) are unable to find the true quality of a specific candidate and adverse selection effect may cause the labor market to collapse entirely.

My paper is trying to introduce these selection process problems by combining different methods, Lemon Markets, Bayesian Signalling Games, Moral Hazard and Principal-Agent problems. (Aliprantis and Chakrabarti, 2000)

In his Nobel prize winner lecture Akerlof[1] showed that informational asymmetries can cause adverse selection on markets. Akerlof studied on markets with the informational problem known as adverse selection where the seller has more information than the buyer regarding the quality of the product. According to imperfect information on the prospective car buyers, borrowers with weak repayment prospects or sellers of low-quality cars crowd out everyone else from the market. Spence demonstrated that under certain conditions, well-informed agents can improve their market outcome by signaling their private information to poorly informed agents. (Akerlof, 2001 and Spence, 2001)

But the other side of the medal is that the firms can also have superior information than the workers exactly opposing from my paper. The asymmetry of information introduces unemployment fluctuations and dynamic wage sluggishness as Acemoğlu mentions. As the information of the firm, whom has superior information, reveals gradually wages fall slowly in response to a negative shock and unemployment exhibits additional persistence. Dynamic bargains and asymmetric information in the wage determination process can be an additional source of persistence in unemployment fluctuations as in non-competitive labour markets, both workers and firms receive rents from the unemployment relation. (Acemoğlu, 2003)

Models
First Part of the Candidate Selection Process
Signaling Games: Perfect Bayesian Equilibrium[2]

A signaling game is dynamic game of incomplete information. There are two players in a signaling game; we will call them player 1(Sender) and player 2 (Receiver). Nature moves first and draws among a number of different types.

1.   For every type if i=1,2,............., n; Nature draws a type t_i for the Sender from a set of feasible types $T=\{t_1, ... t_n\}$ according to the probability distribution $P(t_i)$ where $P(t_i)>0$ for every i and $P(t_1)+.......... P(t_n)=1$.

2.   If j=1,2,........................, n; The Sender observes t_i and then chooses a message m_j form a set of feasible messages $M=\{m_1, ... m_j\}$.

3.   Receiver observes the m_j message but can not observe the *ti* type and chooses an a_k action from a set of feasible actions $A=\{a_1, ..., a_k\}$.

4.   Payoffs are determined by $U_S(t_i, m_j, a_k)$ and $U_R(t_i, m_j, a_k)$.

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[1] Akerlof shared first rank in Nobel Prizes 2001with Michael Spence and Joseph E. Stiglitz
[2] See Gibbons, Robert, Game Theory For Applied Economics for the original text.

Signaling games have been applied extremely widely in economics as they can be used to simulate many real life situations. In Spence's (1973) model of-marketing signaling, the Sender is a worker, the Receiver is the market of prospective employers, the type is the worker's education choice, and the action is the wage paid by the market.

In our model the Sender will refer to the candidate who applies for the job while Receiver will refer to the HRM. The set of feasible messages M={m_1, ... m_j} will be composed by candidates' CVs. We will assume that m1 will refer to qualified CVs while m2 refers to unqualified CVs. Message m1 may be consist of graduating from a good university, having a high TOEFL score, internships, seminars attended etc.

The set of feasible actions A={a_1, ..., a_k } will be consist of only two actions which are whether to call the candidate for an interview (I) or reject the application (R).
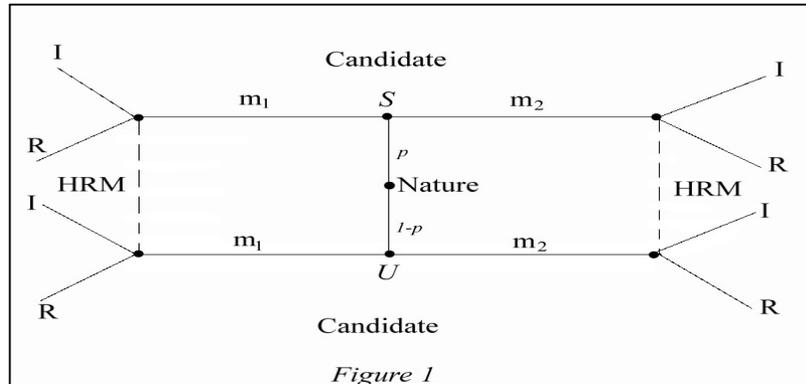
Figure 1

Signaling game, which is a game of imperfect information with no subgames in shown in Figure 1. Here the most important thing is that the game does not begin at a starting point. The action that will start the game is revealed by nature from the middle of the tree to the terminal points. Strategy of a player in any kind of game is a complete plan of his available actions. According to the chosen messages candidate's pure strategy function is m(ti) for every type that nature can reveal while HRM's pure strategy is a function of a(mj) for every message which can be sent by the sender.

So both HRM and a candidate have four pure strategies in the game.

Candidate's strategies:

1. If nature draws a skilled worker, than the worker will play m_1 or he will play m_1 again if nature draws an unskilled worker.

2. If nature draws a skilled worker candidate will play m_2 or he will play m_2 if nature draws an unskilled worker.

3. If nature draws a skilled worker candidate will m_2 or he will play m_1 if nature draws an unskilled worker.

4. Finally if nature draws a skilled worker candidate will play m_2 or he will play m_2 again if nature draws an unskilled worker.

HRM' s strategies:

1. If candidate chooses m_1, the HRM will play I or if candidate chooses m_2 he will play I.

2. If candidate chooses m_1, the HRM will play I or if candidate chooses m_2 he will play R.

3. If candidate chooses m_1, the HRM will play I or if candidate chooses m_2 he will play I again.

4. If candidate chooses m_1 the HRM will play I or if candidate chooses m_2 he will play R.

We call the candidate's first and fourth strategies pooling as each type sends the same message while the second and third separating because each type sends a different message. In a model with more than two types there are also *semi-separating* strategies in which all the types in a given set of types send the same message but different sets of types send different messages. (Gibbons, 1992)

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In fact a Bayesian Signaling Game is a conflict of impressions. The game is constructed on making the other player behave as you want rather then maximizing your payoffs although it is obvious that if he behaves as you like your utility will be maximized. Strategies are a little bit more complicated than the "*prisoners dilemma*" . If you think about the Human Resources newspapers which are given as pull-outs at weekends you will realize that the set of candidates' messages is being conditioned before the game starts. Candidates do not compose their CVs according to their qualifications. Especially in developing countries, even the football team that you are a fan of, your high school or your religious beliefs may be a stronger reason than your academic achievements; a catalyst for being chosen among others.

Most of the HRMs discovered that having only skill and knowledge does not guarantee success. It is the deeper and invisible competencies that are often vital to success. So not only the messages occurred by the impressions of candidates' CVs on HRMs identify whether to hire a candidate but also the interviews are very important.

Second Part of the Candidate Selection Process
The Market for Lemons

The game is a type of two-player game in which one of the players has superior information than the other. The example is a highly stylized version of the market for lemons which was analyzed by George Akerlof in his seminal piece "The Market for Lemons: Quality Uncertainty and the Market Mechanism. In this market there are two types of workers and seller will refer to the workers who supply their labor will.

In such a market the seller usually has a reservation wage W_h if he is a skilled worker. (the lowest wage he is willing to supply his labor). On the other hand buyer, who refers to the Human Resources Manager, has his own reservation wage: a reservation wage of H YTL for a skilled worker(the highest wage he is willing to pay for a skilled worker) and a reservation wage of L YTL for an unskilled worker (the highest wage he is willing to pay for an unskilled worker). For the viability of the market transaction we will assume that $H > W_h$ and $L > W_l$

Another important point is that all reservation wages H ,W_h, L, W_l are known by all players. It is also assumed that $W_h > W_l$ and $H > L$. Finally in this market the seller has superior information than the HRM.

Now let's look at the sequential game that results when a worker supplies his labor in a market which the wages are too low for such a qualified candidate. First nature reveals the quality of the worker whether he is skilled or unskilled (S for skilled and U for unskilled) to the candidate (player1) who decides whether he should ask a high wage, W_h or a low wage, W_l for his labor. The HRM (player2) does not know the quality of the worker but sees the W asked by the worker. Player 2 then has to decide whether to hire player 1 or not. The process is described in Figure 2.

Figure 2
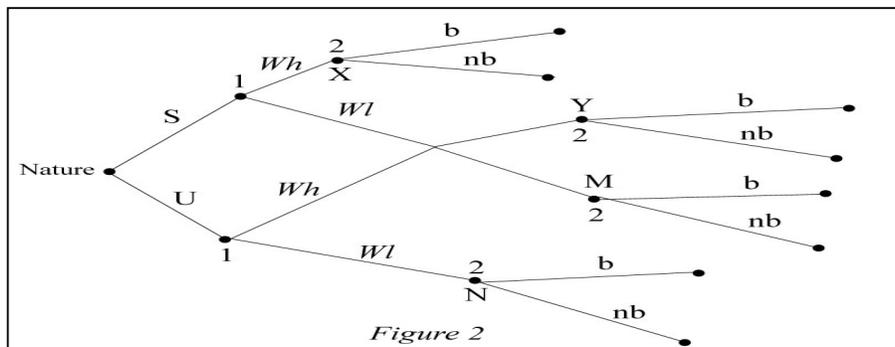
Clearly the sequential game with imperfect information does not have any subgames but once an information set of player 2 is reached it is unclear what player 2 will do as he does not know whether the worker is skilled or unskilled. Which way is rational for player 2 depends on his beliefs about the quality of the worker. The question is what beliefs should a rational player have at

player 2's information sets. The rationality of the player's beliefs depends on the consistency with his choices.

Under these circumstances it may "seem" sensible to believe that

• If player 2 (HRM) observes the listed wage W to be close to W_h, then he should believe that the worker is skilled.

• If he observes the wage W to be close to W_l, then he should believe that the worker is unskilled.

But what if player 1 knows this? Should player 1 charge a high wage if he is skilled and a low wage if he is unskilled. As the game theory is based on the both player's ability of guessing each other's actions and constructing strategies according to these estimations the answer is of course to charge a high wage whether he is skilled or not. It is obvious that the beliefs of player 2 are not consistent with the choices of player 1 given player 2's beliefs. So high wage should lead player 2 to believe that not only skilled labor is supplied but also unskilled labor is supplied at the high wage. Hence the probability of the worker being skilled and unskilled is equal for the HRM. In such a case the HRM will hire the candidate only if the expected value of hiring the worker exceeds the expected value of not hiring him.

$\frac{1}{2}$ (H-W)+ $\frac{1}{2}$ (L-W)≥ 0 or W$\leq \frac{1}{2}$ (H+L) which means that the HRM believes that he is at

node X with a probability of $\frac{1}{2}$ and at node Y with a probability of $\frac{1}{2}$.

In this situation according to player 2's information sets rational points I_1=X, Y are $P(\{X\})=P(\{Y\})=\frac{1}{2}$. If however W_h>W>W_l the HRM will believe that skilled workers do not supply their labor in the market. Thus when the HRM sees a wage W less than W_h should believe that he is at node N with certainty. In this case according to the player 2's information sets I_2=M, N rational points are given as $P(\{M\})=0$ and $P(\{N\})=1$.

Case 1: If $\frac{1}{2}$(H+L)>Wh

In this case since the wage W=$\frac{1}{2}$ (H+L) is greater or equal to the reservation wage W_h

which skilled workers will ask for both quality of workers will supply their labor.

Case 2: W_h>$\frac{1}{2}$ (H+L)

In this case, since W=$\frac{1}{2}$ (H+L) will be offered as the wage, skilled workers will not supply their labor. Therefore only unskilled workers will supply their labor and the wages will settle somewhere between W_l and W.

In 1990s in the golden ages of banks, qualified workers were being transferred with too high wages according to their marginal productivity of labor.(MPL) So in such a competitive sector transfers were implemented not only to have qualified workers but also to build prestige, banks spent lots of money for human resources. But after the 2001 crisis everything changed.

Today a three years experienced bank employee's net rate is 450YTL. (BusinessWeek Turkiye, 2006) Although wages are so low for even candidates whom graduates from economics and business departments of universities, also lots of engineers and other people from various disciplines apply for being a bank employee. Even tough high possibility of being promoted, not being sought for experience(especially in call-centers), premiums, social opportunities make this sector attractive it is not something easily understandable of a candidate's application for a job offering such a low rate level if he has graduated from a respected university. Excluding the private life conditions of individuals why a candidate supplies his labor in such a low rate offering market if he is so skilled?

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It seems quite reasonable of a HRM having a confused mind in the candidate selection process. So choosing the right CV but the wrong candidate is a problem that HRMs usually have to face. Finally we may mention that this kind of uncertainty causes problems for not only HRMs but also the candidates such as over-qualification.

Third Part of the Candidate Selection Process
Principal-Agent Problems:

We have seen how difficult is choosing the proper candidate for a job. But more difficult than this is encouraging this worker work hard as he may choose being lazy rather than working hard.

Optimal Contracts: The Perfect Information Case:

This is a two-player sequential game in which the Principal P is considering about making a contract with Agent A who will either accept the contract or reject it. If he accepts the contract again he will have two choices as either working hard (H) or being lazy (L). We assume that H and L are measured as YTL. If the agent works hard he will make the principal earn 1000 YTL with a probability of 0,8 and 100 YTL with a probability of 0,2. If he is lazy than principal will get 1000YTL with a probability of 0,2 or he will receive 100 YTL with a probability of 0,8. It is also assumed that principal can observe whether the agent works hard or is lazy. The game is a game with perfect information.

The contract that is offered will be denoted by the wage function $W(.)$ where this function takes two values $W(H)$ and $W(L)$. Here our next assumption will be H>L. In Figure 3 the resulting Principal-Agent game is shown. The payoff to the principal in case the worker works hard is $1000YTL-W(H)$ and agent receives $W(H)-H$.

Figure 3
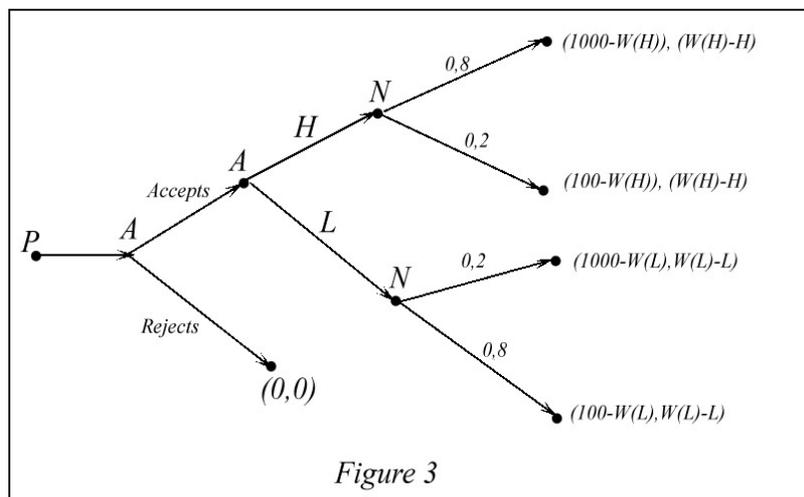
The aim of the principal is to offer a contract to the agent that will induce him to work hard or to be lazy according to his profit for both situations.

If the principal wants the worker to work hard conditions have to be as shown below:
$W(H)-H \geq W(L)-L$ and $W(H)-H \geq 0$
The condition $W(H)-H \geq W(L)-L$ guarantees that the worker will choose to work hard. So expected payoff of the principal is as:
$0,8 \times [1000-W(H)] + 0,2 \times [100-W(H)] = 780 - W(H),$ (1)
If the principal wants the worker to be lazy conditions have to be as shown below:
$W(L)-L \geq W(H)-L$ and $W(L)-L \geq 0$ (2)

The condition $W(L)$-$L \geq W(H)$-H guarantees that the worker will choose to be lazy. So expected payoff of the principal is as:

$0,8 \times [100$-$W(L)] + 0,2 \times [1000$-$W(H)] = 280$-$W(L)$,   (3)

Finally if we solve (1) and (2) simultaneously where $780 - W(H) > 280$-$W(L)$ the principal will prefer the worker to work hard.

As you may realize easily principal-agent problem with perfect information is just a simple cost accounting calculation rather than constructing a production strategy. Whole strategy is based up on a simple equation which is: $\pi > MC$ to make profit for the principal and for the agent gaining a wage which is greater than his reservation wage H or L. H which may be minimum wage, is the cost of working hard for agent while L which can be unemployment insurance, is the cost of being lazy. But with the presence of imperfect information we shall see that the game will become substantially complicated.

Optimal Contracts: Imperfect Information Case:

Here we will assume that the principal is able to observe the outcome only. Now the principal-agent is a game of imperfect information. Game tree is shown in Figure 4.

Figure 4
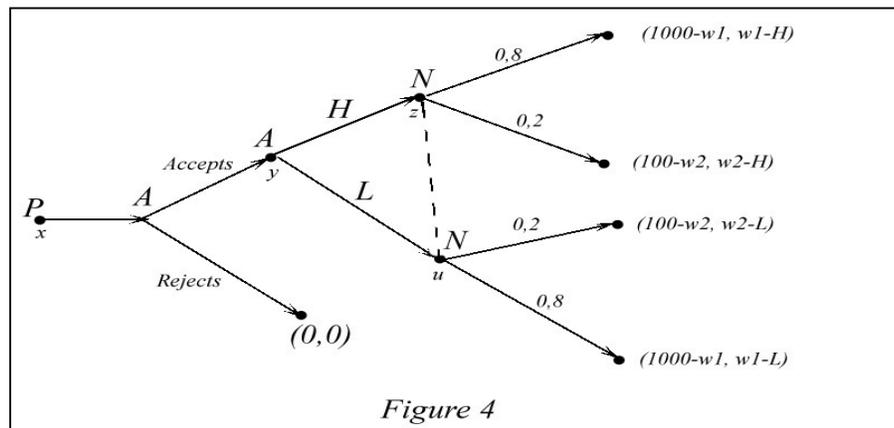
In this case since the principal can only observe the outcome the wage contract $W(.)$ depends on the level of output. So $W(.)$ is now a function of the output's level instead of the level of effort.

$w_1 = W$(high output) and $w_2 = W$(low output) while $w_1 \geq 0$ and $w_2 \geq 0$

In this game a strategy of the principal consists of making a wage offer (w_1, w_2), and a strategy of the agent consists of a plan whether to accept the wage contract or reject it at node X.

If we try to solve the principal maximization problem with an assumption as both the principal and agent are risk-averse by *Lagrange Multiplier Method [3]:*

The *incentive constraint* which will make the agent accept the contract is $0,8w_1 + 0,2 w_2$-$H \geq 0$ while the *individual rationality constraint* is $0,8w_1 + 0,2w_2$-$H > 0,2w_1 + 0,8w_2$-L which will induce the agent work hard.

$L = 0,8w_1^2 + 0,2w_2^2 + \lambda(0,6w_1$-$0,6w_2$-$H+L)$

$$\frac{\partial L}{\partial w_1} = 1,6w_1 + 0,6\lambda = 0 \qquad (1)$$

$$\frac{\partial L}{\partial w_2} = 0,4w_2$-$0,6\lambda = 0 \qquad (2)$$

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[3] see for Lagrange Multipliers Method Thomas/Finney, Calculus 8th Edition Part 2, page: 891

$$\frac{\partial L}{\partial \lambda} = 0{,}6w_1\text{-}0{,}6w_2\text{-}H\text{+}L = 0 \qquad\qquad (3)$$

From equation (3) we can find $w_1 = w_2 + 1{,}66(H\text{-}L)$

If we solve (1) and (2) simultaneously we will find $w_1 = -\dfrac{1}{4} w_2$

When we put w_2 in (3) the solution is $w_1 = \dfrac{H-L}{3}$ and $w_2 = -\dfrac{4(H-L)}{3}$

Conclusion

Principal-agent problem shall be both player's individual maximization problem but in long run it will have negative effects on macroeconomics. For example in a dynamic bargaining framework, agreements often take time so the information reveals gradually. Thus when a bad shock hits the economy, the impact of this shock reveals slowly which is called *'dynamic wage sluggishness'*. Wages are not only high now but also in the future as with dynamic bargaining information about the impact of the shock reveals immediately. As a result the destruction in employment spreads over time. (Acemoğlu, 2003)

So we see that Adam Smith is wrong as the sum of the individuals utility does not equal to the whole society's welfare.

In fact the problem is even the candidate himself knows whether he is suitable or he/she wants to work on that job really although whom we assume that has superior information than the HRM. At that point universities can be mentioned as a mind bending factor as they even can not decide themselves whether to educate students for private sector or being academicians. These confusions effect the set of candidate's feasible messages and the candidate selection process fail at the beginning of the game. Conditioned set of messages misleads the set of HRM's set of feasible actions and results as wrong candidate selection which cause great amounts of selection costs. "*In a global research study - conducted jointly by SHL and the Future Foundation - it was found that the hidden cost of selecting the wrong candidate for a position equals an annual sum of US\$23 billion in the UK and US\$105 billion in the United States. Translating these findings to a South African context, the cost of managing poor performance is estimated to be R29 billion or 2.26% of GDP.* "[4]

Finally undergraduate programs and courses shall be revised in order to innovate this procedure. As a short term solution even transcripts can be used to understand the specialization of the candidates according to the courses they studies in their undergraduate program. Labor has to be educated and may be oriented in to the right sectors according to individuals skills, intellectual capital and wishes as well.

[4] http://www.onrec.com/content2/news.asp?ID=9676

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Impact of Integrated Marketing Communications Programs in Enhancing Manager and Employee Performance

Figen Ebren
Akdeniz University

The global marketplace consists of an increasingly complex arena of competitors within a rapidly changing international environment. New companies are formed on a daily basis, from small businesses to Internet-based operations, to expanding global conglomerates originating from major takeovers and mergers.

In the face of these sophisticated and cluttered market conditions, firms try to be heard. They attempt to speak with clear voices about the natures of their operations and the benefits associated with the firm's goods and services.

With so many choices available, and so many media bombarding potential customers with messages, it is vital that what should be communicated is reaching buyers in a clear and consistent manner.

External customers are influenced by the internal promise deliverers: the employees, channel partners, customer service personnel, packing and delivery people. Marketing can help by working with human resources departments to identify the key elements in employee motivation, including the effect of incentives and the development of training and improvement programs.

This paper explores the impact of integrated marketing communications (IMC) programs in enhancing manager and employee performance and so productivity. From a managerial context, response to this apparently cluttered and amorphous marketing environment has led many organizations to desirable integration of their communications efforts under the umbrella of one strategic marketing communications function - namely integrated marketing communications. The logic of this strategic move would seem to rest partly on assumptions concerning the desire for organizational influence of consumer perceptions.

Manager performance and development is possibly an overlooked part of an IMC program. Effective marketing departments and advertising agencies must develop pipelines of new, talented creatives, media buyers, promotions managers, database Web masters, and others in order to succeed in the long term. Also, new people must be trained and prepared for promotions for more important roles over time. Employee performance attitudes reflect morale within the marketing department and also relations with other departments and groups. An effective IMC plan consists of building bridges with other internal departments so that everyone is aware of the thrust and theme of the program. Satisfied and positive employees are more likely to help the firm promote its image.

Introduction

The global marketplace consists of an increasingly complex arena of competitors within a rapidly changing international environment. New companies are formed on a daily basis, from small businesses, to Internet-based operations, to expanding global conglomerates originating from major takeovers and mergers.

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IMC in the Literature

Although the concept of IMC – managing customer relationships – is not new, the processes used in managing IMC are new. In the early 1990s, some academics as well as some professionals thought IMC was just a fad. But it has proved successful and is being increasingly used in a variety of forms. One of the best ways marketing can take advantage of the new communication and database technologies is by using IMC (Zinkham and Watson, 1996: 165).

Kitchen and Schultz (2000) had indicated that IMC needed to move well beyond such a simple juxtaposition of promotional mix elements, i.e. every element speaks with one voice; to become an integrated philosophy that reaches out and touches every facet of the business that claims to be customer-oriented.

Schultz (1996) stressed that the integration of production, operations, marketing, distribution, finance, communications and all other forms of business activity was inevitable because of the technological revolution occurring throughout the world.

As a basic level, IMC means that all the company's key product and corporate messages, positioning, image, and identity are coordinated (Lindel, 1997). Furthermore, the basic premise of integrated marketing communications is that there are a number of communication objectives for a brand and a number of different means of communication to achieve each of these objectives (Keller, 2001).

Any definition needs to include or refer to concepts such as added value, relationship marketing, corporate branding and the blending of internal and external communications because IMC is seen to include all consistent interactions a stakeholder has with an organization (Fill, 2001).

Internal Marketing

Integrated marketing communication is often compared to an orchestra. Like IMC's various marketing communication functions and all the different media, an orchestra has many different instruments, each of which produces a different sound. If the sounds of these instruments are not coordinated according to a plan, the orchestra produces noise rather than music (Duncan, 2002: 193).

A new trend emerging as the twenty-first century begins is the growing importance of internal integrated marketing communications. Internal marketing communications efforts include creating, packaging, and delivering the organization's IMC marketing message to all employees of the organization. Employees must understand and believe in the firm's image and its marketing position. Employees need to comprehend what each company brand stands for and the benefits it offers consumers. Most importantly, each employee must believe in the company and its mission. Spending more time marketing internally produces more knowledgeable and dedicated employees, who will, in turn, seek the goal of providing excellent service to customers (Clow and Baack, 2004: 116).

Internal marketing has been advocated as a distinctive requirement for service industries in general and for educational marketing in particular. Before selling the services to outsiders, you have to sell what you have on offer inside your organization.

Human Resources Development (HRD) specialists, when marketing their services inside their organization, should apply the same strategies which marketing specialists use to promote products and services outside the organization. Because there are at least two internal "customers", i.e. the short- and long-term, strategic business targets and the people who work in the organization. It is suggested that there should be:

(1) A business-oriented marketing plan, which should include a training marketing mission statement, reflecting the strategic, business-related goals of the HRM/HRD department and shaping its plan of action; cost-benefit and cost-effectiveness analysis techniques, which demonstrate the contribution of selected programmes to business results; and competitive pricing strategies, which take into account the balance between purchasing external training and designing internal programmes.

(2) People oriented marketing of HRD, because no training/HRD effort can succeed without the active support of the people whom it is designed to serve. Those responsible for HRD should develop ongoing market research to gather critical information about employee attitudes, perceived development needs and views and attitudes about past HRD efforts; internal promotion materials; external materials such as newsletters, brochures, news releases, etc (Frank, 1994: 5).

Marketing can help by working with HR to identify the key elements in employee motivation, including the effect of incentives and the development of training and improvement programs. But marketing can help most of all with research, working with HR to determine, internally, what can be done to improve the delivery of "customer-facing" people and help understand what motivates employees, channel partners and customer service people. If we are good at understanding customers, consumers and end-users of our products and services, we should be able to lend those talents to HR to help understand what has often been called internal marketing conducted by internal marketers (Schultz, 2002: 8).

Manager and Employee Performance

As strange as it might seem, many employees do not have a basic understanding of what their company makes, how their company operates, or what their role is in building customer relationships. They simply have not been integrated into the company, and many, especially, have not been educated about the need for being customer focused. One way to integrate employees into the spirit of serving customers is through internal marketing. This is an ongoing program that

promotes the customer-focus philosophy and keeps employees informed of important marketing activities that affect both them and the company's customers. In a world of increasing interactivity due to the Internet and other two-way communication opportunities, internal marketing is important because more and more employees have the opportunity to touch the customer. In case of service brands, where there is personal interaction with customers, employees are the brand. How they perform is how customers perceive the brand's performance. Finally, the more that employees feel like part of the company and the better informed they are about its business strategies, the higher their morale. Research has shown that companies with high employee morale have higher levels of customer satisfaction (Duncan, 2002: 22-23).

One of the primary responsibilities for marketing departments is to interpret the needs of the customer and the marketplace and bring that information to all departments. In addition, MC planners must involve other departments in the planning processs, and then inform these other departments of the final plan and why it is worth supporting. Marketing needs buy-in and support from all departments whose work affects customers. That's everyone: Even employees who do not deal directly with customers support other employees who do.

This communication to internal stakeholders is called internal marketing. It is defined as "the application of marketing inside the organization to instill customer-focused values". Employees especially those touching the customer, should be thought of as customer also. The more they are satisfied, the more they will satisfy customers. Companies can increase morale and productivity keeping employees informed so they aren't embarrassed when asked about certain programs, letting them have a sneak preview of promotional materials before they begin running, and letting them know the results of their efforts to build strong brand relationships.

It is important to note that in some industries (e.g., office machines, automobiles), service personnel rather than sales and marketing people are the ones most likely to have ongoing contact with customers. For suppliers to grocery and discount stores, the truck's driver may be an important contact point and may even have the responsibility of shelving the products or setting up merchandising materials. Thus, the truck drivers do not represent the company but also are the first to be aware of product and marketing communication problems and other customer concerns. Customer-contact employees can be a primary resource about the state of the marketplace, product performance, and provide opportunities for continuing sales and relationship marketing communication.

Internal marketing puts a process in place for employees to report back to marketing. Front-line employees, in particular, need to be linked to a company's information-gathering system in order to give feedback about what customers are thinking and how they are acting. Formal programs enable customers to participate in roudtables, where customers are brought together to discuss a brand's and company's operations and product performance (Duncan, 2002: 225).

Like external marketing, internal marketing is communication-dependent. This communication takes many forms including intranets, company newsletters, e-mail, voice mail, and bulletin boards. There are three basic aspects of internal communication: informing employees, empowering them, and listening to them (Duncan, 2002: 225).

Informing

Communicating a customer-first business policy, as well as other marketing programs to employees, is a responsibility of internal marketing. Such a philosophy is an out growth of the recent upsurge in emphasis on customer service and customer relationship management (CRM). Another objective is to continually impress on employees the importance of being responsive to customers.

Empowering

Internal marketing, because it provides employees with more information, is also a natural program to support employee empowerment programs, which mean giving front-line employees the power to make decisions about problems that affect customer relationships. As companies downsize and place more responsibility at lower levels, more decisions that affect customer relations are being made by service employees have, generally the better decisions they will make. Empowerment programs must therefore be supported by training and information about company policies. The necessary elements of a support program that creates empowered and responsive employees are presented in Table 1.

Table 1. Empowering Employees

The more employees are empowered to make their own decisions when responding to customers, the more they need to be:

- informed of their role in satisfying customers
- informed of their role in the company' s success
- rewarded based on a balance of their individual performance and the company's overall performance
- listened to when they have ideas how to better serve customers even when those ideas involve other areas of operations
- given easy access to customer information files and other databases that enable them to make quick and knowledgeable responses

Listening

Just as external marketing should include two-way communication, so should internal marketing. If an internal marketing program only sends messages, employees will see the program as propaganda. In order for its messages to have integrity, internal marketing must encourage and facilitate employee feedback, which then enables managers to know if employees understand the internal marketing messages, agree with these messages, and are willing to support the various marketing programs. Even more important, because employees usually are closer to customers than are managers, internal marketing feedback can provide valuable real-time customer research to help in planning and budgeting.

Moreover, listening to employees can provide valuable real-time customer research that helps in budgeting, planning and adjusting MC plans. A justified criticism of some MC plans is that they're made in corporate office ivory towers. Such plans don't address the real problems and opportunities in the marketplace. Customer-contact employees can be a valuable source of competitive and product performance information (Duncan, 2005: 200).

The internal promise deliverers influence external consumers: the employees, channel partners, customer service personnel, and packing and delivery people. All those people who are supposed to deliver the "fast, friendly service" and well-made, error-free products and services that every organization promises but has such difficulty delivering on a consistent basis influence them (Schultz, 2002: 8).

Manager performance and development is possibly an overlooked part of an IMC program. Effective marketing departments and advertising agencies must develop pipelines of new, talented creatives, media buyers, promotions managers, database Web masters, and others in order to succeed in the long term. Also, new people must be trained and prepared for promotion for more important roles over time (Donald and Baack, 2004: 514).

Employee performance and attitudes reflect not only morale within the marketing department but also relations with other departments and groups. An effective IMC plan consists of building bridges with other internal departments so that everyone is aware of the thrust and theme

of the program. Satisfied and positive employees are more likely to help the firm promote its IMC image (Donald and Baack, 2004: 514).

The primary internal stakeholders are the employees of the organization, unions, and corporate shareholders. Employees should receive a constant stream of information from the company. Many employees are quite distant from the marketing department, yet they should still be aware of what the company is trying to achieve with its IMC program, even if this means only basic knowledge. Those closest to the marketing department are going to be more acutely aware of the nature of the IMC plan, including how the company's message theme is being sent to all other constituents (Donald and Baack, 2004: 404).

To work effectively in communicating with employees, the public relations department must keep in close contact with the human resource (HR) department. Publications and communications aimed at employees must be consistent with the image and message that the firm is espousing to customers and other groups. For example, any firm that uses advertising to suggest that employees are always ready to assist customers should make sure those employees are aware of the message. Employee behaviors should then be consistent with the advertising theme that is being conveyed to customers. The HR department should try to hire the kind of worker who is attracted to such an approach and structure performance appraisals and rewards to favor those who buy into the company's overall IMC approach. The emphasis on providing information about company activities must logically extend to every public relations event and sponsorship program (Donald and Baack, 2004: 405).

Guidelines On Internal Marketing

Internal marketing requires the same discipline as external marketing, but it needs a different focus. Here's how to get it right:

- Insiders want to be on the 'inside track', so trying to communicate with them using external campaigns merely distances them. Equally, running employee surveys - a typical human resources practice - won't engage employees either.
- Employees need to be targeted as a distinct audience, and most organisations would benefit from some kind of internal communications specialist to distil the best of marketing and HR into a tailored employee-focused campaign.
- Internal communications should sit within corporate communications or marketing. If it sits within HR, it often becomes a vehicle to communicate HR issues and misses out on broader areas.
- Don't forget that, unlike customers, staff are part of your brand, not just recipients. You have to educate them, motivate them and measure them as well as simply communicate with them. But engaging and involving them in the brand is crucial.
- Ensure that staff know everything about your brand before the customers do. There is nothing worse for an employee than being in a shop with a customer who knows more than you do. It's such an obvious point, but often overlooked.
- Try to achieve interaction between marketing and HR. Sharing each others' viewpoints will bring better results (Simms, 2003: 27).

Developing a customer-focused organization is not a marketing task, it's a management task. Top managers are the only ones who can provide the resources, facilities, information and, yes, even the tools to create customer-centric organizations. The real key to building a customer-oriented organization starts with knowledge—customer knowledge and lots of it. This includes knowledge of customers' relation- customers. To many managers, this means lots of high-tech, whiz-bang technology, such as on-line systems, interactive re-sources, pull-down windows and the like.

But customer knowledge need not depend on the latest technology. It depends on making what the people who touch, interact with and relate to them every day already know about customers and prospects inside the organization available. In other words, customer knowledge can

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be passed around by sharing what the organization already knows, or making what is inherent in customer relationships available to the people who need to know.

The academic community is beginning to recognize the need to relate internal customer orientation to organizational market orientation. Using variables such as internal marketing processes, training, management support, internal communication, personnel management and involvement in external communication, it is demonstrated that internal customers (employees) are very important to the external market orientation of the firm.

It is becoming increasingly clear that employees enhance or destroy the value of marketing and marketing communication programs delivered to external customers.

Employees are customers of the marketing organization. Management's responsibility is to empower, if not emancipate, employees to become customer-focused and customer service providers. And to do that, management must provide the tools and resources that allow employees to become customer intimate (Schultz, 1998: 6).

Like external efforts, internal marketing identifies the audience, finds out what media best reach that audience and the message is disseminated promptly and accurately. Unlike external marketing, a company's own managers can control most of the variables of the project. Either way, the channels of communication must be established long before news breaks, so that messages can be transmitted clearly (Cleaver, 1998: 1).

Internal marketing has been defined as selling the firm to its employees or the process of attracting, developing, motivating, and retaining qualified employees through job products that satisfy the needs. Internal market of employees is best motivated for service mindedness and customer-oriented behavior by an active, marketing-like activities are used. As the building of customer orientation among employees by training and motivating both customer-contact and support staff to work as a team. As an expanded explanation, internal marketing is the application of marketing, human resources management and allied theories, techniques, and principles to motivate, mobilize, co-opt, and manage employees at all levels of the organization to continuously improve the way they serve external customers and each other. Effective internal marketing responds to employee needs as it advances the organization's mission and goals. This revised definition reminds us that internal marketing is both customer-focused and employee-focused. Marketing has no exclusive claims to this important marketing function; it demands an integrative approach, drawing not just from marketing but also from organizational behavior, human resources management, and other fields. This definition also alerts that the term customer orientation should be broadened to include external as well as internal customers, the latter being any department or unit that is served by another unit within the same organization. Internal marketing is then not just for front-line employees, important as they may be to the delivery of quality service to ultimate consumers (Benoy, 1996: 54-55).

The three components of internal marketing are rewards (rewarding and motivating employees), development and providing a vision. In order to implement internal marketing, external marketing techniques, including market research, segmentation, developing a marketing mix, and controlling marketing activity may be used within the organization. These activities are also likely to be structured in a formal internal marketing plan, even though some uncertainty may remain as to who should be involved in the implementation stage of the process. The ultimate responsibility for initiating internal marketing rests with senior management and the internal marketing programme requires continuous management support to be effective. To implement internal marketing, cross-functional co-ordination is often needed, particularly between the human resources and marketing departments. The internal marketing plan can then be integrated with the external marketing plan.

Research, both within marketing and human resources management (HRM), has explored the impact of employee friendly supervision and management on the behavior of frontline staff. Within the marketing domain, internal marketing has been proposed as a set of employee friendly managerial behaviors that have several internal and external consequences for the firm. This is also reflected within the HRM literature, where it is generally accepted that aligning HR policies with marketing can have beneficial impacts on both employee behaviors and attitudes, and on

organizational outcomes. Internal marketing uses a marketing perspective for managing an organization's human resources. It is based on the philosophy of viewing organizations' jobs as internal products and employees as internal customers of these. This allows organizations to manage the employee-employer exchange by modifying existing marketing tools and techniques to the internal environment of the firm. This has led to operationalizations of internal marketing that directly reflect those of external marketing. Two researchers developed an internal marketing mix that directly parallels the external marketing mix. In operationalizing internal marketing this way, researchers suggest that jobs or projects constitute internal products, the price is what the employee has to give up to complete the job, promotions are presented by internal communications, and distribution by meetings in which ideas are presented to employees (Lings and Greenley, 2005: 290-291).

Conclusion

IMC programs must communicate internally to employees and departments so that the firm can reach outward with a consistent, strong voice projecting the qualities and benefits of the firm's goods and services. Those companies that incorporate effective business-to-business components into their overall IMC plans stand better chance of remaining successful in future years of operation.

Internal marketing communications efforts include creating, packaging, and delivering the organization's IMC marketing message to all employees of the organization. The firm's image, its marketing position and its mission should be understood and believed by the employees. Employees need to comprehend what each company brand stands for and the benefits it offers consumers. Spending more time marketing internally produces more knowledgeable and dedicated employees, who will, in turn, seek the goal of providing excellent service to customers.

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Impact of Trade Liberalization on the Gender Gap in Turkey

Özge Kama

Yıldız Technical University

There has been an increasing number of literature on globalization and its effects on labour markets. With increasing global economic competition employment conditions have changed. Evidence shows that greater trade openness is associated with increase in women's share of paid employment. In this paper, we concentrate on the aspects of trade on gender discrimination and particularly Turkey's situation on this context.

In the period of 1970-2005 there was substantial overall improvement in women's quality of life, as reflected in social indicators. Women lived longer, had fewer children and more schooling. From the statistics, we can say that there is a moderate rise in women's participation in the labour force. Usually, schooling, participation in politics and work and earnings can be used to measure women's achievement in comparison with men's.

Focusing on Turkish economy, we know that in 24th January 1980 Turkey announced to follow a far reaching program of stabilization with structural change. The main objective of the program was to shift from an inward to an outward oriented development strategy. With an increase in trade, women transferred from the non productive housework economy to the productive economy. So, it is possible to say that trade create jobs for women but what about the gender gap? There is a quite number of literature for believing that the effect of globalisation may act to widen the gender pay gap. As long as women remain less qualified than men, they are likely to remain lower paying jobs, even if better-paying jobs become available through trade expansion.

Introduction

The concept of globalization cannot be explained without looking at women's participation rates to the work force. There has been an increasing number of literature on globalization and its effects on labor markets. With increasing global economic competition, employment conditions have changed. Economic competition is became prominent with trade which is mostly seen as a deriving force of earning profits. Trade surely creates opportunities for both men and women but women mostly work at low skilled and low paying jobs. With the liberalization of trade, unskilled workers earn less in terms of relative wages while workers who were highly skilled gain.

In this paper, we concentrate on the aspects of trade on gender discrimination and particularly Turkey's situation in this context. Conventional wisdom says that foreign direct investments and trade openness brings jobs and exchange of knowledge, therefore prosperity and technologic progress. Prosperity may mean a better income for the family, and a better income may cause women to stay at home for child bearing and housework. However, this is not the case for most of the developed countries. Analyzing country reports, it is clearly seen that with an increase in growth rates there is a substantial increase in women's participation to the work force (UNCTAD, 2004). So, the raise in wages had created an incentive for women to participate in paid work.

Furthermore, a study by Gladwin and Thompson (1995) showed that there is a significant increase in women's quality of life with raising incomes in developing regions. Economic freedom mostly brings a broader access to education, health services and political parties. All these result in a better quality in the living standards of women. We can relate this concept with Amartya Sen's (1999) freedom perspective. As he suggests, economic unfreedom can breed social unfreedom, just as social or political unfreedom can also foster economic unfreedom.

There have been a vast number of debates going on about gender issues which mostly started after World War II. After the War the number and percentage of women who work for pay have been increased. In contrast, men's labor force participation rates have been declining. In 1950, 86.4 percent of men aged 16 and over were in the labor force; by 2004, this ratio has dropped to 66.3 (U.S Department of Labor Statistics, 2004). Statistics can be used as an evidence to show how women's position in the labor market has improved in the last quarter of the century. Over the last three decades women have fewer children and much likely to return to work while their children are still young.

Moreover, some differences between women and men are deeply rooted in culture and may last for decades. In particular, a major part of the difference is explained by personal choices to marry and have children. Existing literature have shown that the earnings of single men and single women with equivalent qualifications are similar. When we compare single men and married men, it is seen that married men earn more than single men but the reverse is not true since employers think that married women may give priority to their children at the expense of work.

This shows the asymmetrical effects of the institution of marriage on male and female incomes (Block, 1992).

Turkish Economy

The 24th January 1980 Decisions were a turning point in Turkish economy. Within these Decisions Turkey attained a more outward-oriented and market based economic system through exchange rate policy and export subsidies. Before the Decisions were implemented the government has had a leading role in the economy with intensive government inventions. During the 1970s, agriculture maintained its dominance but it is also a time of exports to changed in favor to manufacturing. The period beginning with the Decisions have caused a fundamental change of the composition of GDP in favor of industry. During the period of 1983-1987 export revenues increased at annual rate of 10.8 percent, and gross domestic product rose at annual rate of 6.5 percent (Boratav & Yeldan, 2001).

In 1989, the capital account was fully liberalized by the issuance of Decree No.32. With this Decree all residents are permitted to buy foreign exchange and foreign stock exchanges. The Decree is important for allowing non residents to establish a company, participate in a new or existing company, to make investment by opening a branch and to engage in all activities aiming at production of all kind of goods and services.

Table 1. Labor force participation and growth rates for population and unemployment (%)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
	Total	66,0	66,4	66,7	67,1	67,5	67,8	68,2	68,6	69,0	69,4	70,4	70,6	70,7	70,9	71,1
	Male	63,8	64,2	64,5	64,9	65,2	65,6	65,9	66,3	66,7	67,1	68,1	68,2	68,4	68,6	68,8
	Female	68,3	68,7	69,1	69,4	69,8	70,2	70,6	70,9	71,3	71,8	72,8	73,0	73,2	73,4	73,6
Population Growth(‰)		19,9	19,5	19,2	18,9	18,5	18,4	18,3	18,0	17,6	16,9	14,1	13,8	13,5	13,2	12,9
	Total	8,0	8,2	8,5	9,0	8,6	7,6	6,6	6,8	6,9	7,7	6,5	8,4	10,3	10,5	10,3
	Male	7,8	8,7	8,8	8,8	8,8	7,8	6,9	6,5	6,9	7,7	6,6	8,7	10,7	10,7	10,5
	Female	8,5	7,1	7,7	9,3	8,1	7,3	6,0	7,8	6,8	7,6	6,3	7,5	9,4	10,1	9,7
	Total	56,6	57,0	56,0	52,2	54,6	54,1	53,7	52,6	52,8	52,7	49,9	49,8	49,6	48,3	48,7
	Male	79,7	80,3	79,7	78,1	78,5	77,8	77,3	76,8	76,7	75,8	73,7	72,9	71,6	70,4	72,3
	Female	34,2	34,1	32,7	26,8	31,3	30,9	30,6	28,8	29,3	30,0	26,6	27,1	27,9	26,6	25,4
Female Employment Rate to Non –Agricultural Sectors (%)		15,8	15,5	16,6	16,6	17,0	16,9	16,8	17,7	18,3	18,2	19,2	19,0	20,6	20,6	19,9

Source: OECD Historical Statistics.

Between the years 1990-2004 there has been a similar increase in the life expectancy rates for both genders. While life expectancy is extending there has been a decrease in population growth. Although participation levels in many countries have increased, among the OECD countries, Turkey has the lowest participation rates between the ages 15-64. One explanation might be the low wages that lead women prefer to stay out of labor force for child bearing and housework. On the other hand, The World Bank has another explanation for this situation, as a consequence of staying longer at school, Turkey has declining percentages in participation rates to the work force. Another reason why Turkey's participation rates are lower can be explained by low public and private investment rates. Investment levels are so low that it becomes difficult for both genders to find job opportunities. This has a very big influence on females because of the traditional male breadwinner model. It's appropriate to indicate that male breadwinner model is declining but the model has not disappeared (Warren, 2004). But the crisis of 1999 has caused unemployment rates for both genders to soar.

The light manufacturing sector, of which the garment and textile industries are part, has been of vital importance in the development of Third World economies. Women mostly work in these sectors. Trade does not provide employment opportunities only in the goods sector but also in the services sector as it can clearly be seen from the Turkish data.

Some sectors are more likely to absorb the female workforce. As shown in Table 2, the female labor force participation in wholesale and retail trade, restaurants, hotels have raised rapidly between the period of 1990 and 2000. Between these years a similar aspect can be seen in the social and personal services. Participation rates has been continually increasing but in the last decade there has been fluctuations resulting from the past crises. The latest crisis has sent down the growth rates to -7.4 in the beginning of 2001.

Women typically provide their labor mostly to the low technology-based, labor intensive section of the garment industry in the developing countries. In 1970, manufacturing sector had an absolute advantage which can be seen from Table 2. Although Turkey's liberalization process has started in 1980's, manufacturing industry has lost its dominant role in the following years is another interesting point. There is no big gap is seen between the female and male participation rates as a

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percentage in the manufacturing sector. Turkey can be seen as a semi-developed country. It has surely started a process of transformation towards services but agriculture still holds its magnitude. Women provide a large proportion of the labor force that goes into agriculture in the developing countries and in Turkey. Nearly 75 percent of all the female economic activity takes part in this sector. In the last three decades there has not been a big difference occurred on the employment status for females. Women are still seen as unpaid family workers. In the period of 1970 -2000 women can not be seen as very important entrepreneurs. Some increases occurred but female entrepreneurs formed only 0.89 percent of the female employment in 2000.

Table 2. Economic Activity

Census year Female	Total	Agriculture, hunting, forestry & fishing	Manufacturing industry	Construction	Wholesale & retail trade restaurants, hotels	Transport, storage & communication	Finance, insurance, real estate & business services	Social & personal services
1970	5 812 545	5 199 918	289 916	8 783	27 136	16 060	30 816	180 778
1975	6 204 322	5 484 490	257 439	4 977	46 716	18 168	53 211	272 233
1980	6 813 509	5 948 959	303 510	4 700	50 318	26 004	76 078	358 503
1985	7 492 733	6 484 257	332 248	6 697	81 798	31 387	98 698	441 248
1990	8 408 414	6 900 466	560 346	10 718	138 030	38 659	153 879	578 633
2000	9 429 736	7 133 056	624 180	19 419	344 938	63 124	263 900	964 301

Source: *Household Labor Force Survey (SIS)*

Normally, young females living in rural areas have much less of an opportunity to receive a full primary education and this effect the incomes of females. Equal access to education is an important step towards greater gender and income equality. Many studies have found a strong correlation between gender equality and economic growth (Dollar and Gatti, 1999). Causality is from economic growth to gender equality. As income grows, families are more willing to allocate resources to the education of girls. There is a clear difference on the female incomes according to level of education. Illiterate and low skilled women have a clear disadvantage in the labor market and this affects their incomes. Nearly 82 percentages of these two groups don't have a regular income. With an increase in the education levels there has been a substantial increase in regular incomes.

Over the 1990 to 2001 the illiteracy rate increased from 92.7 percent to 96.7 percent. The increase in the enrollment of education is caused by Government's inventions to improve education. In 1997, the Government increased the duration of compulsory education from five to eight years. Ministry of National Education estimated the enrollment rates for primary education for the next five years and they are expecting a 100 percent enrollment.

Examining the female income statistics, there are obvious distinctions when analyzed regionally. Marmara and Aegean regions have an advantage on the economic activity for the female incomes. The lowest incomes earned by the females are in the Eastern Anatolia and Southern Anatolia regions. This situation is not very diverse in the male employment. Turkey wants to be a member of the European Union and in order to reach this end, she is trying to maximize the national growth rates. Thus, some metropolitan cities are privileged in this sense, especially Istanbul. After the 1980s, there has been a devastating immigration to the metropolitan cities in search of non-farm employment. In line with these immigrations inequalities among the geographical regions had

increased. As a result, women are taking more responsibility for the family properties in the rural areas.

Table 3

Employed population by employment status, 1970-2000

Population 12 years of age & over

Census year	Total	Employee	Employer	Self employed	Unpaid family worker
Female					
1970	5 812 545	595 103	11 786	385 419	4 820 237
1975	6 204 322	876 513	8 122	294 018	5 021 626
1980	6 813 509	945 851	7 218	323 471	5 535 511
1985	7 492 733	1 072 481	10 750	351 067	6 058 365
1990	8 408 414	1 489 263	19 355	612 768	6 286 865
2000	9 429 736	2 289 330	84 753	564 147	6 491 303
Male					
1970	9 306 342	3 577 596	93 701	3 650 953	1 984 092
1975	11 179 506	4 510 014	137 123	3 870 665	2 648 546
1980	11 708 813	5 216 151	169 241	3 953 786	2 323 995
1985	13 064 053	5 905 700	182 198	4 311 114	2 663 495
1990	14 973 479	7 501 464	293 820	4 591 394	2 584 412
2000	16 567 405	9 024 700	592 563	4 664 344	2 283 709

Source: Household Labor Force Survey (SIS)

Table 4. Percentage of household members by income source and main characteristics

		Female			
		Have personal income			
		Only activity	Activity & non activity	Only non	Do not
	Total	Income	Income	Activity income	Have income
Total					
Illiterate	100	5,3	4	10,2	80,5
Literate without diploma & primary school	100	7	2,4	5	85,6
General junior high school & high school	100	6,6	9,6	7,4	76,4
Vocational junior high school	100	12,2	22,9	15,4	49,6
University & higher	100	9,4	63,1	8,4	19,2
Employment status					
Working	100	18	14,4	1,3	66,3
Not working	100		-	- 10,1	89,9
Place of settlement					
Urban	100	6,8	6,8	8,9	77,5
Rural	100	6,5	3,6	4,5	85,5
Region					
Marmara	100	9,1	6,4	8,3	76,1
Aegean	100	9,9	6,9	8,5	74,6
Mediterranean	100	7,7	5,5	7,1	79,7
Central Anatolia	100	4,5	5,8	7,8	82
Blacksea	100	4,4	4,9	5,7	84,9
Eastern Anatolia	100	1,2	1,8	3,6	93,5
Southeastern Anatolia	100	5,2	2,1	2,6	90,1

Source: Household Labor Force Survey (SIS)

Now, women in the rural areas have more responsibilities over the family farms but accessing to the productive resources like credits, inputs and market opportunities still creates barriers for them. Their productivity is constrained and they have difficulties in adopting new technologies. The increase in their responsibilities may not be shared in controlling the revenues of the crops. In a globalized world farmers have to compete with large scale food companies for having a share in the domestic markets. With constraints facing the females, it is very difficult for

them to compete in the domestic markets, so they have changed their production patterns to meet their family's basic food needs.

Usually increases in the contributions of females to economic life bring more contributions to the legal system. Turkey has made considerable progress in achieving legal gender equality but political life is still organized by traditional norms. Traditional male breadwinning comes upon once again in the decision making. Since 1930s women has right to vote but they mostly have to vote for men candidates because of their low participation rates in the political arena.

Table 5
Number of parliamentarians by election year and sex

Election year	Total	Female	Male	Female %
1935	395	18	377	4,6
1939	400	15	385	3,8
1943	435	16	419	3,7
1946	455	9	446	2
1950	487	3	484	0,6
1954	535	4	531	0,7
1957	610	7	603	1,1
1961	450	3	447	0,7
1965	450	8	442	1,8
1969	450	5	445	1,1
1973	450	6	444	1,3
1977	450	4	446	0,9
1983	400	12	388	3
1987	450	6	444	1,3
1991	450	8	442	1,8
1995	550	13	437	2,4
1999	550	22	528	4
2002	550	24	526	4,4

Source: Household Labor Force Survey (SIS)

The governance system in Turkey has been centralised but there has been some progresses with the help of international institutions to break this chain. Since 1997 UNDP has been assisting a programme called Local Agenda 21. The main objective of the programme is to stregthen local governance by ensuring that civil society participates in decision making. Programme promotes the role of women in strengthening democratic local governance in Turkey through a participatory process built around transparency and accountability.

The statistics shown in the Table 5 indicates that some progress has to be done to break this male dominated atmosphere. This concept is also crucial for the European Union. Non-discrimination and gender equality are among the fundamental values on which the European Union is based. They are also a part of the Copenhagen political criteria, which have to be met by all candidate countries as well as Turkey.

Conclusion

Globalization has many effects on the labor markets and especially on female labor force. With increasing global economic competition, employment conditions have changed. Evidence shows that greater trade openness is associated with increase in women's share of paid employment. In this sense, Turkey's transformation process is analyzed and found that with an increase in trade and more access to the economic markets, quality of life has increased especially for women in the country.

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Social Capital and SME's: A Study on Lakes District Enterprises

Murat Ali Dulupçu
Süleyman Demirel University

İlker Hüseyin Çarıkçı
Süleyman Demirel University

Gökhan Özdamar
Süleyman Demirel University

Hakan Demirgil
Süleyman Demirel University

The rapid change in technologies and markets (innovations) as well as government policies has induced firms and localities to take collective actions to enhance their capacity to adapt and respond to uncertainty (Lundvall, 1998). In this regard current approaches to economic development draw upon diverse theoretical fields and concepts but there is some agreement as to the importance of social capital (Coleman, 1988; Putnam, 1993; Sabel, 1993). Social capital refers to embeddedness of trust and strong civic relations in a locality that serves as a source of competitiveness through cooperation. The SME's are, naturally, both creators and users of the social capital in a locality. It is observed that different regions perform different qualities in the creation and exploitation of social capital in Turkey. Thus, this study aims to analyze and identify the attitudes of the SME's towards networking, trust and collaboration in Lakes District (Isparta and Burdur Provinces) in order to assess the social capital capacity and capability. Is there a certain level networking among SME's? Do they trust each other in their local business environment? Do they trust other local actors such as business chambers and local authorities? Is there awareness about collaborative business development among SME's? The findings of such questions will help policy makers to design effective strategies in order to improve the role of social capital in economic development process.

This study depends on a survey conducted in 2005. 66 SME's were chosen from KOSGEB's regional data inventory which includes 250 SME's for Lakes District. In this survey, 50 questions questionnaire was used. The data collected have been evaluated by SPSS and MINITAB. In order to explore the social capital attitudes and differences among the SME's, discriminant analysis, t-test and ANOVA are used.

The social capital was categorized into (i) supportive structure of local actors (ii) collaboration among SME's (iii) trust at different levels. The initial findings are less supportive of a strong social capital among SME's and between SME's and local actors.

It is expected that informal and social relations should have been much developed in less developed economies, mainly as a consequence of less capitalization of social processes. Ironically, strong social relations in developing countries are not enough to produce/reproduce social capital. Referring to Putnam (1993), trust and civicness can be assumed as more compatible producers of the social capital (Keating, 2001) instead of strong social relations.

Introduction

Current approaches to (regional) economic development draw upon diverse theoretical fields and concepts but there is some agreement as to the importance of social capital. Various researchers from a wide range of disciplines stress the role of social structure in the process of economic development (Gambetta, 1988; Fukuyama, 1995; Landes, 1998; Coleman, 1988; Putnam, 1993). In this regard, social capital refers to embeddedness of trust and strong civic relations in a locality that serves as a source of competitiveness through cooperation. This kind of so-called "*copetition*" (cooperation+competition) is becoming more vital in the global market where firms and localities have to face with an increasing competition fostered by high mobility. Thus, the rapid change both in technologies and markets (innovations) as well as government policies has induced firms and localities to take collective actions to enhance their capacity to adapt and respond to uncertainty (Lundvall, 1998), and social capital is the one of the main routes to collective action.

In the era of globalization, the SMEs are regarded as the ultimate impetus employment, innovation, entrepreneurship and prosperity. So it is inevitable to connect a (strong) tie between SMEs and social capital, yet the coin is two sided: the SMEs are both creators and exploiters of the social capital in a locality. This makes SMEs a central issue at the heart of social capital. Although 99% of business enterprises comprise of SMEs in Turkey, their share in value added, credit and export are very low compared to the European counterparts (OECD, 2004). In other words the SMEs in Turkey seem to have problems in the fields of innovation and finance which are assumed to be solved or enhanced through social capital as stated by various adherents of social capital literature (Puntam, 1993; Ruuskanen, 2004). Unfortunately the studies and the measurements of social capital on Turkey are very limited and even they are not related to SMEs and regional development. For example Akçay (2002) has studied the relation between social capital and corruption in a group of country including Turkey. In another paper, Turkey and Brazil is found to be least developed countries among 47 economies in terms of social capital (Norris, 2000). Almost the same conclusions are reached by a cross-country analysis of social trust in which Turkey appears to be at bottom of the list among the OECD economies (Healy and Sylvain, 2001: 44). The basic indicator in the literature about Turkey is World Value Survey (Fidrmuc and Gërxhani, 2005) and generally the trust is used as the main proxy to measure social capital (Erdoğan, 2006; ARI Hareketi, 2006). On the other hand, the need to stress social capital in Turkey and collect fine data on it argued by many others (see: KOSGEB, 2005; Kenar, 2003). The only study related to entrepreneurship and regional development is by Yetim (2002) where she investigated social capital formation among females in Mersin province.

This study has a few intertwined goals. The paper mainly aims to analyze and identify the attitudes of the SME's towards networking, trust and collaboration in Lakes District (Isparta and Burdur Provinces) in order to assess the capacity and capability of social capital. We also investigate the awareness among SMEs towards collaborative business development and their attitudes towards local actors such as business chambers and local authorities. The findings of such investigations will help policy makers to design effective strategies in order to improve the role of social capital in economic development process.

Social Capital: A View into the "Kaleidoscope"

Despite the discussions and agreement on the increasing role of social capital in economic development, it is becoming more difficult to sort out the exact meaning and definition of it. Nearly all the recent studies begin with an explanation of various types of social capital, yet with a stress on its uniqueness (Ruuskanen, 2004, Paxton, 2002, Puntam, 2000). This kind of growing academic and political appetite on social capital might be related to the social dimension of economic development which is well-known among evolutionary and institutional economists since Polanyi's (1944) study about the embeddedness of economic actions within the social environment (See also

Granovetter, 1985; Barber, 1995). However so-called "enthusiasm" (Putnam, 1993; 2000) on social capital may be connected to a set of reasons. Firstly, the developed economies already seem to exploit all or most of the available tangible resources. Accordingly these economies are trying to find out new forms of competitiveness including intangible ones. For developing countries, on the other hand, limited availability of tangible factors of production makes social capital more attractive as a new factor of production. Second, the re-invention of regions and localities turns the focus on the relations among regional actors (Dulupçu, 2005). This, in turn, fosters arguments on relational assets, such as associational economy, untraded interdependencies, learning region where social capital is an infrastructure for all, and obviously at the regional level these kind of soft relations take place intensively (economic localness). Third, the indigenous development rather than the solely FDI's oriented development is becoming more important, and social capital is assumed to be an asset to accelerate endogenous development.

Through trust, members of a group enable the social structure to take collective action which can create benefit to all parties. So under the uncertainty of a highly globalized economy, structures of social relations, like association, family, friendship, ethnic group or community generate economic coordination, like family business, local networks or alliances which increase economic performance through reducing transaction costs, and increasing productivity, mobility, flexibility and innovation.

Although there are some negative arguments on social capital such as lock-in or social immobility in a society or exclusion of non-members of a group (Portes and Sensenbrenner, 1993, Grabher, 1993), the mainstream tendency seems to be very positive and optimistic. As Cooke (2000) puts it "…social capital is a missing ingredient of economic development". The adherents of social capital follow a series of reasoning to explain the relation between the performance of economy and society and social capital (Boschma, 2005). Firstly social capital improves the flow of information in social or local networks, and enables the easier exchange of knowledge which is vital for the SMEs where search for knowledge is an important item of the costs. Whereas the exchange of codified knowledge is almost free, the transmission of tacit knowledge is generally difficult and necessitates closer and informal relations among regional actors. In this context, collective and interactive learning among SMEs is an important source and consequence of social capital. But we have to keep in mind that trust is a must *-sine quo non-* for such a learning activity. Second, it reduces the transaction costs, such as information costs, research costs, contracting costs and bargaining costs. For example, in a trustful environment firms do not need to ask for detailed contracts which in turn reduce the costs mentioned above. Third, social capital supports the creation of human capital (Coleman, 1988). And finally it improves the effectiveness of institutions of governance.

Social capital however contains some fuzziness both at the theoretical and conceptual levels. Sometimes, it is difficult to distinguish the sources and consequences of social capital, i.e. is trust or an associative action a source or a result? This is mainly due to the intangible nature of it hence it includes unwritten norms, values and social relations with multi-dimensional and non-transferable characteristics. Social capital, unlike human capital, is not owned (Cooke, 2000) and this makes cloning social capital almost impossible. It is neither transferable nor replicable. Additionally, the uniqueness of social makes it more difficult to compare the relation between economic development and social capital. Instead of its impact on general economic growth, social capital has more impact on specific economic activities. Furthermore it is very difficult to measure accurately the stock of social capital. It is easy to destroy but hard to create because it is a time-consuming process to create social capital and there is no substitution for social capital.

The SMEs and Regional Economic Development: The Lakes District Region

Social capital exists and performs at different scales (family, community, network, and organization-local-regional-national levels). As stated earlier the local and regional level is assumed to be most appropriate due to the proximity. Sharing common values and norms along with trust is a

cumulative process like learning: the more you trust, the more social capital is created, and correspondingly any society attracts more participants who have the capability to support social capital creation. But firstly we need social capital infrastructure for any locality. Thus, first of all, for a region having collective goals rather than individual actions, is a pre-condition to build up a strong social capital. The availability of social capital in a certain region means that the locality has openness and a will to collaborate, and able to mobilize resources through developing both horizontal and vertical high caliber networks (Flora et al., 1997). In this regard the institutional environment plays a crucial role through interaction for a common goal. Especially for the SMEs, the competitiveness is highly related to social capital as a valuable input; because it is heterogeneous and immobile likewise labor (Maskell, 1999).

Competitive Factors of the Lakes District SMEs'

"The Lakes District" is the name given to the region which comprises both the provinces of Isparta and Burdur, and also a very minor area of the neighborhood provinces. Basically, the Lakes District term refers to Isparta and Burdur provinces. Existence of 26 natural and 21 artificial (dam) lakes provide the concept of the name for the region. Thus the geographical characteristics define the region. The region is located in the middle of a triangle between Konya, Denizli and Antalya provinces where Konya and Denizli have a significant share in Turkey's industrial production and Antalya is the most important tourism center of Turkey. The productions of the SMEs in Isparta heavily concentrate in textile (yarn, carpet, fabric), food, lumber, marble, tanning, and rose oil industries. On the other hand, the SMEs in Burdur mostly produce the goods in the sectors of agriculture and animal farming. The productions of the SMEs in Burdur intensify in milk products, feedstuff, garment, chemistry, plastics and machinery processing industries. The natural beauty and historical background of the region also attracted the tourism investments towards the region in recent years. (TOBB: 2003) According to the census of year 2000, Isparta and Burdur respectively; have a population of 514 thousand and 257 thousand; and have a percentage of 0.5 and 0.3 in Turkey's GNP. The education level of the population of the region is also very satisfactory due to the existence of a higher education institution_ Süleyman Demirel University. (DPT: 2006)

The socio-economic development of the provinces of Turkey has surveyed through the indicators of employment, education, industry, agriculture, finance, infrastructure and welfare by the State Planning Organization (DPT) in 1996 and 2003. In the latter survey, Isparta and Burdur were identified as the third degree socio-economic developed provinces where the agricultural structure is dominant and the SMEs do business both at provincial and regional scales. The socio-economic indicator values of the mentioned provinces are close to Turkey's averages. (DPT: 2003)

Table-1: Socio-Economic Development Rankings of Isparta and Burdur

	Isparta	Burdur
Socio-economic Development Place (1996, in 76 provinces)	21	29
Socio-economic Development Place (2003, in 81 provinces)	28	31
Development Place of the Education Sector (2003, in 81 provinces)	28	20
Development Place of the Health Sector (2003, in 81 provinces)	4	14
Development Place of the Manufacturing Industry (2003, in 81 provinces)	32	41

In a recent work, by Dulupçu et al. (2005), some conclusions were reached about the competitive factors of the Lakes District SMEs. According to this work, the SMEs of the Lakes District positively interpreted their entrepreneurship culture and their interest to the sector which they took place, although the collaborative environment in the region was interpreted as the least positive factor. On the other hand, it is observed that there is a very strong connection between the success of the local authorities/administrative actors (municipality, governorship, chamber of commerce and industry, etc.) and collaborative environment. The result of the work expresses that there is no fundamental difference between the structures of industrial and service sectors in the Lakes District, but the SMEs acting in the service sector are both more entrepreneurial and more

capable of creating dialogue (or cooperation) than the SMEs acting in the industrial sector. Moreover, the negative approach to the local authorities/administrative actors is interpreted as a sign of underdevelopment of the social capital in the Lakes District.

Methods
Survey Administration
This study depends on a survey conducted in 2005. The instrument administered to the owners or managers of the firms. Anonymous questionnaires were distributed via mail and returned by each respondent directly to the researchers. The final sample used in the study consisted of 66 SMEs and was drawn from KOSGEB's (Small and Medium Industry Development Organization) data inventory, which includes 250 SMEs for the Lakes District.

Measure
The survey instrument was composed of 44 items. The respondents were asked to indicate the level of agreement on each item by choosing one of the five scales, that is from (1) never agree to (5) always agree_ a standard Likert scale. According to the conceptual model of the study, the dependent variables of the research divided into two main groups: Collaboration among SMEs, and trust at different levels among firms, local institutions and other stakeholders. The collaboration and trust levels are measured using the statements like "I rely on the activities of Chamber of Commerce and Industry; the Municipality supports collaboration efforts in our region etc." Cronbach's alpha coefficient for the scale was 0.7906 which is sufficiently reliable.

Hypotheses and Data Analyses
The two basic hypotheses are as follows:
Hypothesis 1: There is a strong relationship between trust and collaboration among local economic actors of the Lake District Region.
Hypothesis 2: Differences of firm structure, province and sector have strong effect on collaboration and trust levels among local economic actors.
Data analyses were conducted in two steps. In the first step, ANOVA was performed to test for the significance of difference between betas. In the second step, logistic regression analyses were used to test the hypothesized relations between the dependent and independent variables.
Results
Table-2: Descriptive Statistics

	N	Mean	Std. Deviation
The interest level of the local administrators towards the firms' problems	66	2,03	1,15
The collaboration level of the local actors	66	2,21	,87
The contribution of the municipality on the development of the collaborative environment	66	2,24	,99
The contribution of the governorship on the development of the collaborative environment	66	2,32	,98
The contribution of the Chamber of Commerce and Industry on the development of the collaborative environment	66	2,52	1,03
The contribution of the municipality to the economical life	66	2,59	,99
The trust level among local economic actors	66	2,65	,92
The contribution of the university to the economical life	66	2,68	1,18
The effect of the socio-economic activities in the province to the institutional environment	66	2,76	1,01
The contribution of the governorship to the economical life	66	2,79	1,05
The collaboration level of the firms within the other firms working in their sector	66	2,83	1,06
The contribution of the Chamber of Commerce and Industry to the economical life	66	2,85	1,27
The firms' attitude towards establishing a multi shareholder business	66	3,05	1,22
The firms' attitude towards doing a collective business with other firms and associations	66	3,20	1,03

The mean values in Table 2 indicate that the managers/owners of the firms find the interest level of the local administrators to the problems of regional firms quite low. Likewise it is seen that the contribution of the municipality, governorship and the Chamber of Commerce and Industry on the development of the collaborative environment is perceived low as well. The results show that the trust level among the local actors is also low whereas the firms' attitude towards establishing a multi shareholder business or doing a collective business with other firms and associations is a little higher.

Multivariate logistic regression analysis was used to test hypotheses as to the effect of firm structure, province/region and sector on the likelihood of (1) collaboration culture and (2) trust level. The results of the logistic regression analysis are summarized as Table 3.

Table-3: Logistic Regression Results

	Collaboration Culture			Trust Level		
Constant	-7,868* (3,184)	-9,212* (3,514)	-6,578** (3,387)	-12,345* (4,813)	-13,185* (4,918)	-13,014* (5,067)
Region/province	-1,311 (1,063)			-2,248 (1,409)		
Sector		0,757 (1,024)			0,334 (1,225)	
Firm Structure			-1,107 (0,896)			0,019 (1,050)
Trust level	1,748* (0,714)	2,092* (0,719)	2,140* (0,740)			
Collaboration Culture				1,156** (0,696)	1,373* (0,698)	1,356* (0,696)
The attitude towards doing a collective business with other firms and associations	1,283* (0,549)	1,204* (0,547)	0,951** (0,534)			
The attitude towards establishing a multi shareholder business	-1,196* (0,597)	-1,179** (0,624)	-0,971** (0,556)			

Standard Errors in Parentheses, (*p<0.05, **p<0.1)

Results of the regression analysis provide support for hypothesis 1. According to the results the firms in the region have a positive relation between their perception of collaboration and trust. It can be said that as the trust level of the firms towards other firms and economic actors in the region increases, the collaborative level will increase as well. Similarly the desire to collaborate will increase the trust level in the region.

Results of regression analysis do not provide support for hypothesis 2. It is seen that the home province of the firms do not have any effect on the structure of the firm, the collaboration nor the trust level of the sector they work in.

As seen in Table 3 the two main factors that affect the perception of the collaboration is the desire to establish a multi shareholder business and doing collective business with other firms and associations. Thus, it can be said that the low level of perception of collaboration is affected only by the desire to work together. In other words, the expectation from the local economic actors (The Chamber of Commerce and Industry, the municipalities, etc.) is very low.

The firms in this study are studied in two groups: Family businesses and multi-shareholders. Since the multi-shareholders have different partners, who all want to survive and share the same goals such as profit and growth, they need to be more assured. Thus trust is much more essential in the multi-shareholders. Another interesting result is that the SMEs in the Lake District want the Chamber of Commerce and Industry to play a key role as a catalyst in the trust building process.

As a result, we find some gripping evidence that trust level and collaboration culture affects one another simultaneously. Honestly, collaboration culture couldn't be set up without trust.

Concluding Remarks

Although regional development studies focus on developed economies, informal and social relations are much developed in less developed economies, mainly as a consequence of less capitalization of social processes. Ironically, strong social relations in developing countries are not enough to produce/reproduce social capital. Regional development studies, referring to Putnam (1993), assumed trust and civicness -the mutually dependant variables- as more compatible producers of the social capital (Keating, 2001) instead of strong social relations. That is to say, social capital as a form of 'informally institutionalized democracy' leads to an environment where different local players can compete without disturbing each other. This kind of development is most probably related with the long tradition of democracy that teaches people and institutions how to negotiate. On the other hand, in developing countries, the politicized economic relations possibly avoid evolution of deeply rooted civic traditions. Hence, shared regional culture and goals are more likely to be born premature, often without aiming at wealth creation. In developed countries, the institutionalized relations enables proximately located small firms, non-governmental organizations, universities and local bodies to response collectively to uncertainty through forming 'institutional thickness' (Amin and Thrift, 1994). The findings of this study support this argument. Unless trust is created, the region can not produce collaborative structure and environment. Thus local administrative actors in Lakes District should seek new ways and forms for enhancing trust level along with cooperative structure.

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Estimating the Social Return on Schooling

Marcelo Soto
Instituto de Análisis Económico

A number of papers .nd that changes in schooling are not correlated with changes in per capita income. Two non-competing interpretations that have been given are that the social return on schooling is close to zero and the measurement error of changes in schooling is high. This paper shows that the lack of significance of schooling is threefold. First, there is a problem of a proper definition of the way in which years of schooling should enter in a production function. Second, collinearity between physical and human capital stocks seriously undermines the ability of educational indicators to display any significance in panel data estimates. And third, failure to cope with measurement error and endogeneity produces biased estimates. As opposed to the earlier empirical literature, the social return of schooling is positive and significant, but no Lucas-type externalities are observed.

Introduction

A recurrent question that has characterised the debate on economic growth during the last decade refers to the puzzling lack of correlation between years of schooling and income per capita in empircal research. This evidence has led to different examinations and reinterpretations of the role of education. Benhabib and Spiegel (1994) have put forward that the level of education should not be seen as a factor of production, but as a determinant of changes in total factor productivity. Also, in subsequent versions of an influential paper, Pritchett (2001) has argued that the poor institutional framework, low quality and excess supply of schooling in developing countries are all responsible for the lack of empirical link between changes in educational attainment and economic growth. Cross-country evidence reported by Temple (2001) supports the Pritchett hypothesis. Paralleling these results a series of panel data studies have also failed to .nd signi.cance of schooling in standard growth regressions (Bond et al 2001; Caselli et al 1996; Islam 1995).

The purpose of this paper is to try to reconcile the macro evidence with the micro findings on the returns to schooling. The paper argues that, although the Pritchett hypothesis may apply to some speci.c countries, it cannot explain the null or even negative coefficients for years of schooling. The causes of these findings must be found somewherelse.

This is not a paper about why changes in the schooling variable cannot explain per capita income growth between 1960 and a later date, as first noted by Benhabib and Spiegel (1994). This has already been addressed by Krueger and Lindahl (2001) who single out measurement error in years of schooling as the central cause behind this finding. Instead, the focus here is on how, given the estimation problems found in the literature, to compute reliable estimates on the social return on schooling.

There are basically three issues that have to be considered. First, there is a problem of a proper definition of the way in which years of schooling should enter in a production function. The subjacent question is how to relate the number of years of schooling to human capital. Put simply, this is a discussion on whether the macro return to education should be evaluated in a log-log or log-linear formulation. This question can be settled empirically and has already been addressed elsewhere (Bils and Klenow, 2000). A second issue refers to the appropriate functional form to be estimated. As is shown later, a simple statistical problem of collinearity between physical and human capital stocks, a point surprisingly neglected in the earlier literature, may be seriously undermining educational indicators.ability to display any significance in estimation in levels. The third point refers to the consistency of the estimates. Empirical research has usually relied on OLS or fixed-effect estimation and therefore has overlooked endogeneity and measurement error problems. This omission has certainly led to inconsistent estimates.

As many authors have noted, the discussion on why education fails to display positive effects in growth regressions is more an academic issue than one pertinent for policy decisions. The policy relevant question is whether schooling presents social returns that are higher than the private ones, which could provide empirical support for orienting decisions on public spending in education. The paper offers a range of values for the social return to years of schooling. It will be seen that social returns exceed the standard private returns found in micro studies only if physical capital is assumed to respond to changes in human capital. Assuming return homogeneity the full sample estimate of the income response to one additional year of schooling is around 8:0%. This is in the range of micro-Mincerian returns reported by Psacharopulos (1994) and Psacharopulos and Patrinos (2002) for country-level studies.

However, there seems to be substantial heterogeneity in the macro-Mincer coefficients across countries. Two main results emerge from the data. First, the macro Mincer coefficients bear no relationship with micro coefficients reported by Psacharopoulos. In particular, schooling has no significant effect on aggregate income for the group of countries with the highest micro Mincer coefficients. And second, schooling has no significant effect on income in the group of countries with lowest quality levels.

The bottom line of these new results is twofold: contrary to the earlier findings, the social return to education displays positive and statistically significant values but these values are not higher than the private returns. Therefore no Lucas (1998) type externalites are observed in the data.

The paper is organised as follows: the next section discusses the most influential results and the current state of the literature on the macro-returns to schooling. Section 3 highligths the difficulties in estimating this return and presents new empirical results. Section 4 explores the effects of return heterogeneity across countries and considers alternative de.nitions of human capital. The main conclusions are presented in section 5.

Literature

The empirical literature on macro returns to education has two broad sets of studies. The first, based on endogenous growth models, suggests that the level of education affects the income growth rate, as in Benhabib and Spiegel (1994). In these models the level of human capital is not characterised as an input of the production function, but as a determinant of domestic innovation and of absorption capacity of foreign technologies. Benhabib and Spiegel show that in a growth regression the change in years of schooling, whether measured by Kyriacou (1991) or Barro and Lee (1993), provides non-significant and sometimes even negative coefficients. On the other hand, they find that the level of schooling is positively -though not always significantly correlated with growth. Undoubtedly, these results are the first to have questioned empirically the view that human capital is to be treated as an additional factor of production.

Informal growth regressions à la Barro, which are closer to the neoclassical frame work since they imply the existence of a steady state in income level, also postulate a growth-on-level formulation. In these regressions the educational level is sometimes seen as a state variable, i.e. a variable measuring the proximity to the steady state (Barro and Sala-i-Martin, 1995) and sometimes as a determinant of the steady-state itself (Barro, 1997).

The second tradition is based on the neoclassical model .revived. by Mankiw, Romer and Weil (MRW, 1992)[1]. In this tradition, human capital is represented as a factor of production in an extended version of the Solow model as follows:

$$Y = AK^{\alpha}H^{\beta}L^{1-\alpha-\beta}$$

Here Y represents total output, K and H are total physical and human capital respectively, and L is the labour force. From equation (1) and standard laws of motion for K and H, MRW show that both, the output level and growth may be related to the investment rate in physical and human capital. These two equations represent, respectively, the steady state and convergence path of income. Then, in their empirical analysis, MRW show that human capital investment is signi.cant in both equations. For human capital investment MRW use the secondary enrollment rate multiplied by the fraction of population aged 15 to 19 in the working age population.

The empirical results of this in.uential paper are nevertheless shadowed by the fact that MRW fail to control for the endogeneity of the investment rates and by the murkiness of their measure of human capital investment. Examples of papers that have tackled the endogeneity problem for testing the MRW model are Caselli, Esquivel and Lefort (1996) and Islam (1995). In both papers the schooling variable appears with the wrong sign.

The availability of data on both physical and human capital stocks has made possible the direct estimation of level-on-level or change-on-change regressions. Pritchett (2001) follows this last option. Based on Mincer (1974) wage equations, Pritchett builds a human capital index given by:

$$h = e^{rS} - 1 \qquad\qquad (2)$$

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[1] Endogenous growth models a la Lucas (1988) also see human capital as an input of the production function.

where h is human capital per worker, r is the return to education (which Pritchett sets at 0.1) and S is the average number of years of schooling from Barro and Lee (1993). He then uses OLS and IV methods to estimate the following cross-section regression,

$$\hat{y}_i = \hat{A}_i + \alpha \hat{k}_i + \beta \hat{h}_i + \epsilon_i \tag{3}$$

where $y = Y/L, \; k = K/L$ for each country i and $\hat{g}$ stands for the growth rate of variable g, over the period 1960-1985. As in Benhabib and Spiegel (1994), Pritchett finds a non-significant β, implying that changes in schooling have had no impact on economic growth. Furthermore, when the income level y_i is regressed on the level of physical and human capital, the significance of β is also rejected. The interpretation of this result is however radically different from the one given by Benhabib and Spiegel. Pritchett highlights the institutional characteristics where increases in education have taken place and argues that: i) the education provided has low quality and so it has not generated increases in human capital; ii) the expansion in supply of educated labour has surpassed demand, leading to a decrease in the return of education; and iii) educated workers may have gone to privately lucrative but socially unproductive activities.

However, even if all these phenomena may be actually taking place, they can hardly be the reason behind the apparent lack of productivity of education in macro empirical studies. First, it is di¢ cult to believe that the provision of education has been of such a low quality in some countries that on average the world return is zero. Moreover, as shown later, if countries with higher levels of schooling bene.t from better quality and productivity of schooling, then standard methods of estimation would provide world average returns biased upwards, not downwards. Second, even assuming that the supply of education has increased more rapidly than demand, this cannot by itself imply that one additional year of schooling leads to a null increase in production. Besides, in Pritchett.s argument is implicit the idea that shifts in demand or supply would alter a technical parameter, which is a rather unconventional assumption. And third, the hypothesis that most of the increases in education have been devoted to socially unproductive activities around the world - which would be necessary to explain a null global return- is simply at odds with reality: we do observe that more educated people are employed in better-remunerated activities, which themselves are registered in the national account systems. Again, this simple observation does not mean that all skilled workers are devoted to socially productive activities, but the opposite is not true either.

More recently, Temple (2001) has revisited Pritchett.s results. He has explored the effects of estimating the MRW production function (1) by assuming different formulations for human capital. With the same database as Benhabib and Spiegel (1994), Temple estimates the following cross-section regressions:

$$\Delta \ln Y_i = \mathbf{C}_0 + \alpha \Delta \ln K_i + \beta \Delta f(S_i) + \gamma \Delta \ln L_i + \Delta \varepsilon_i \tag{4}$$

where f(Si) is a function of the number of years of schooling. In particular, Temple reports results for f(Si) = rSi and for $f(S) = c_0 + c_1 ln(S_i) + c_2(1/S_i)$. None of these yielded significant coefficients at standard levels. Temple concludes that .[. . .] the aggregate evidence on education and growth, for large sample of countries, continues to be clouded with uncertainty..

The systematic failure of cross-country regressions to display positive effects from education has led to some researchers to question about the quality of the data on education. Topel (1999) and Krueger and Lindahl (2001) argue that measurement error in the number of years of schooling is a major cause of the apparent lack of significance of ΔS in growth regressions. In both papers the authors report panel data results for the following equation for country i in year t:

$$\Delta \ln y_{it} = \pi_1 S_{it-1} + \pi_2 \Delta S_{it} + \pi_3 \ln y_{it-1} + \Delta \tau_t + \Delta \varepsilon_{it} \tag{5}$$

where τ_t represents a time-specific effect. The years of schooling variable is from Barro and Lee (1993), which according to Krueger and Lindahl, has less measurement error than Kyriacou.s (1991) data. Topel and Krueger and Lindahl estimate (5) by using different data frequencies. They find that in high frequency regressions (i.e. panel data with 5-year observations) ΔS is not

significant, while in lower frequency regressions (10 or 20-year observations), ΔS becomes significant. The authors argue that in short periods of time ΔS has a low informational content relative to the measurement error and this is why in 5-year data regressions the significance of ΔS is rejected. But in longer periods of time true changes in S are more likely to predominate over measurement errors. Furthermore, Krueger and Lindahl show that if the estimate of π_2 (in the regressions with 20-year observations) is adjusted by taking into account the downwards bias induced by the measurement error in S, its magnitude shoots from 0.18 to 0.30. Topel finds a non-adjusted π_2 as high as 0.25 in a similar regression. These values suggest huge returns to education, and if taken at face value, they would imply large positive externalities.

Yet, these findings must be looked at with some caution for three reasons. First, the regressions are not based on a speci.c growth model. The use of lagged income suggests that equation (5) represents a convergence path towards steady state. But in that case it is hard to justify the presence of both, the change and the level of schooling simultaneously. Recall that MRWaugmented model states that in a convergence path, income growth depends on the investment rate of human capital (not on its level or change).

Second, in almost all the regressions reported, the endogeneity of years of schooling is completely neglected. This variable is likely to be endogenous since richer countries may afford more spending in education, hence a higher level of education. Not dealing with the endogeneity of S means that its coefficient is likely to be biased upwards.The few regressions reported by Krueger and Lindahl that were estimated with instrumental variables methods make use of Kyriacou.s series as instruments (as a solution to the measurement error problem). However, this instrument does not represent a solution to endogeneity since it is itself an endogenous variable. Krueger and Lindahl argue that the attenuation bias introduced by measurement error is higher than the upwards bias inherent to the endogeneity of S. But this argument, by itself, does not justify not using suitable instruments -like lagged values of endogenous variables to overcome the measurement error or endogeneity problems. A straightforward estimation method that deals with both sorts of biases looks as a much more natural method of estimation.

A third reason to be cautious about these results is that ΔS is significant only when the change in the stock of physical capital is omitted from the regressions. When Krueger and Lindahl include $\Delta \ln(k)$, ΔS loses its explanatory power, while physical capital growth gets a coefficient as high as 0.8. This is much higher than the standard share of physical capital in total income - which is thought to have a ceiling at around 0.5 (see Gollin, 2002)- and consequently is a clear sign of endogeneity problems. Only when the coefficient associated to $\Delta \ln k$ is constrained to 0.35, ΔS recovers its significance. Krueger and Lindahl conclude that: .Overall, unless measurement error problems in schooling are overcome, we doubt that cross-country growth equations that control for capital growth will be very informative insofar as the bene.t of education is concerned.

To illustrate the effects entailed in the omission of physical capital consider Table 1. Columns (1) and (2) reproduces the estimates of equation (5) reported by Krueger and Lindahl (2001) and Topel (1999) for the regressions based on 10-year observations (over the period 1960-1990). Series for GDP per capita and per worker are fromWorld Penn Table Mark 5.6 and years of schooling are from Barro and Lee (1993). These results show that both, the change and the initial level of years of schooling have a positive effect on economic growth. The differences in point estimates are due to the different methods of estimation. Krueger and Lindahl.s results are obtained by OLS, while Topel uses the Within estimator, hence the large downward bias of lagged income. From these results the authors conclude that schooling has an effect on growth. Columns (3) and (4) replicate these regressions by using Cohen and Soto (2001) series on years of schooling, for 83

countries.[2] The results are very close to those of Krueger and Lindahl, whether GDP per capita or per worker is used. However, when the change in capital stock is included[3] in column (5) the coefficient on the change in years of schooling falls dramatically and becomes insignificant. The further inclusion of the initial level of physical capital stock causes the initial level of schooling to lose its significance as well. On the other hand, the large coefficient on physical capital reflects that endogeneity is biasing upwards this coefficient. Yet, endogeneity of physical capital by itself may not be the cause behind the vanishing effect of schooling. Moreover, if countries invest more on education as they become richer, schooling would also be affected by an upwards simultaneity bias.

Table 1

The fading effect of schooling on growth

Dependent variable is annualised change in $Ln(y_{it})$

	K-L (per capita) (1)	Topel (per worker) (2)	This Paper (per capita) (3)	This Paper (per worker) (4)	This Paper (per worker) (5)	This Paper (per worker) (6)
Observations	292	290	230	230	230	230
ΔS_t	0.086 (0.024)	0.058 (2.15)	0.081 (0.036)	0.093 (0.041)	0.028 (0.023)	0.008 (0.022)
S_{t-1}	0.004 (0.001)	0.009 (2.35)	0.003 (0.001)	0.003 (0.001)	1.6e-3 (0.6e-3)	2.4e-4 (6.7e-4)
$\ln(y_{t-1})$	-0.005 (0.003)	-0.050 (6.45)	-0.005 (0.004)	-0.006 (0.003)	-0.004 (0.002)	-0.016 (0.004)
$\Delta\ln(k_{it})$					0.574 (0.042)	0.607 (0.041)
$\ln(k_{it-1})$						0.011 (0.003)
R^2	0.284	0.481	0.268	0.287	0.634	0.666

Notes: Time dummies included (not reported). Columns (1) and (2) are from Krueger and Lindahl (2001) and Topel (1999), respectively. OLS estimates, except for Topel, who reports fixed-effect estimates. Standard errors in parenthesis, except for Topel who reports t-statistics. 10-year observations for the period 1960-1990. Variables in changes are annualised. y_{it} is GDP per capita or per worker, from Summers and Heston, PWT 5.6; S_{it} is years of schooling from Barro and Lee (1993) in columns (1) and (2) and from Cohen and Soto (2001) in columns (3) to (6); k_{it} is stock of physical capital per worker from Easterly-Levine (2001).

Krueger and Lindahl argue that measurement error in S is exacerbated by the inclusion of physical capital, hence the lack of significance of schooling in the regression with $\Delta \ln k$. However, the next section shows that even the estimation in levels .which is less subject to measurement error problems.produces non-significant coefficients for years of schooling. Therefore, something in addition to measurement error is affecting the estimation of the social return to schooling, unless Pritchett was right in his assessment about the fact that education has not promoted economic growth in the last decades.

The paper shows that rather than a consequence of measurement error, the lack of significance of years of schooling is the comovement of physical capital and years of schooling. This hypothesis is explored below, in the framework of a standard production function.

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[2] The complete Cohen and Soto (2001) database on years of schooling and educational attainment is available at: ttp://www.oecd.org/dataoecd/33/13/2669521.xls
[3] Physical capital stocks are from Easterly-Levine (2001).

Rediscovering Education

The previous section highlights the difficulties that the earlier literature has found when trying to estimate the social return on schooling from equations in first differences. A natural solution in order to gauge this return is to run regressions in levels or a combination of levels and first-differences. Assuming constant returns on K and H, and setting ln h = rS[4], equation (1) yields the following testable system of equations:

$$\ln y_{it} = \alpha \ln k_{it} + (1 - \alpha) r S_{it} + \eta_i + \tau_t + \epsilon_{it}, \qquad (6)$$

$$\Delta \ln y_{it} = \alpha \Delta \ln k_{it} + (1 - \alpha) r \Delta S_{it} + \Delta \tau_t + \Delta \epsilon_{it} \qquad (7)$$

where η_i and τ_t are respectively country and time specific effects, and ϵ_{it} is a residual. The assumption of constant returns on K and H $(i.e. \ \alpha + \beta = 1)$ allows the identi.cation of r and has no implication on the results that are presented below. Indeed, the social Mincerian return is the semi-elasticity of income with respect to years of schooling. And this can be estimated without any prior knowledge about factor shares in total income.

Table 2 reports estimates for α and $(1 - \alpha) r$ resulting from different methods of estimation. The first column shows the OLS estimates for the equation in levels (6). The physical capital variable is highly significant and its estimated share in total income is 0:60, larger than the conventional wisdom.about this variable. Conversely, years of schooling do not turn out to be signi.cant. Column 2 shows the results for the equation in differences (7), which are similar to those obtained for the equation in levels. Namely, years of schooling are not significant, as earlier cross-country growth regressions have already found[5] . As for the GMM estimates, none of them results in a significant coefficient for years of schooling[6]. The estimation in levels (regression 3), which uses lagged first-differences of the regressors as instruments, produces qualitatively simalr results to the OLS estimates. What is more, the standard Arellano-Bond estimator (column 4) provides a negative coefficient -although not significant- for ΔS and an excessively high α. Blundell and Bond (1998) and Blundell, Bond and Wind meijer (2000) have shown that in finite samples the difference GMM estimator have a large bias and low precision when the series have a strong autoregressive component. This is certainly the case of the physical and human capital series. When the variables are strongly autoregressive the authors show that the system GMM estimator, which estimates simultaneously the equation in levels and in first differences, provides more precise estimates and lower biases in finite samples. Yet, the system GMM estimator yields a non-significant coefficient for years of schooling (column 5).

The fact that none of the regressions that make use of instrumental variables produces significant estimates for years of schooling suggest that the measurement error problem is not the only reason causing insignificant coefficients. Another econometric problem that may be behind this result is collinearity between physical capital stocks and years of schooling.

Figure 1 shows the relationship between years of schooling (S) and the logarithm of physical capital per worker (k). The correlation between both variables is considerable, as is shown by the large R^2 obtained from an OLS regression of ln$k$ on S (without time dummies). An illustration that the high collinearity between physical and human capital is undermining the precision of the estimates can be made by regressing equations (6) and (7) without the physical

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[4] The original Mincerian equation also includes terms in labour experience and squared labour experience. This is explored in section 4.

[5] Note that since estimation in .rst-di¤erences implies the lost of the .rst observation, the results are not directly comparable to those of column 1.

[6] The standard errors reported for GMM correspond to one-step estimates. Indeed, Blundell and Bond (1998) and Blundell et al (2000) show that the two-step standard errors underestimate the true variability of the coe¢ cients, and so the lead to under-rejection of non-signi.cant coe¢ cients. See indmeijer (2000) for a correction of this problem.

capital variable. The results are shown in panel B of Table 2. There, all the methods of estimation except for the difference GMM estimator -result in significant coefficients for S. Even the equation in differences, when estimated by OLS, provides a non-null coefficient. Needless to say, these results are subject to inconsistency problems due to the omission of physical capital. This is patent from the implicit high return on schooling. But the fact that, by omitting physical capital, years of schooling become highly significant is a sign that collinearity may be affecting the precision of the estimates in panel A.

Table 2

The effect of schooling in a standard production function

Equation estimated is: $\log(y_{it}) = \alpha\log(k_{it}) + (1-\alpha)rS_{it} + \eta_i + \tau_t + \varepsilon_{it}$

Panel A: With physical capital

	OLS (Levels) (1)	OLS (Differences) (2)	GMM (Levels) (3)	GMM (Differences) (4)	GMM (System) (5)
Observations	313	230	313	230	313
Log(k_{it})	0.604[a] (0.047)	0.585[a] (0.043)	0.574[a] (0.140)	0.815[a] (0.171)	0.695[a] (0.132)
S_{it}	0.010 (0.018)	0.024 (0.022)	0.033 (0.059)	-0.046 (0.108)	-0.016 (0.056)
Sargan (p-values)	–	–	0.183	0.219	0.399

Panel B: Without physical capital ($\alpha=0$)

	OLS (Levels) (1)	OLS (Differences) (2)	GMM (Levels) (3)	GMM (Differences) (4)	GMM (System) (5)
Observations	313	230	313	230	313
S_{it}	0.249[a] (0.018)	0.088[b] (0.041)	0.259[a] (0.031)	-0.312[c] (0.169)	0.253[a] (0.031)
Sargan (p-values)	–	–	0.795	0.015	0.061

Notes: Time dummies included (not reported). Robust standard errors in parenthesis. 2-step results for GMM estimates. 10-year observations for the period 1960-1990. y_{it} is GDP per worker, from Summers and Heston, PWT 5.6; S_{it} is years of schooling from Cohen and Soto (2001); k_{it} is stock of physical capital per worker from Easterly-Levine (2001).

Figure 1
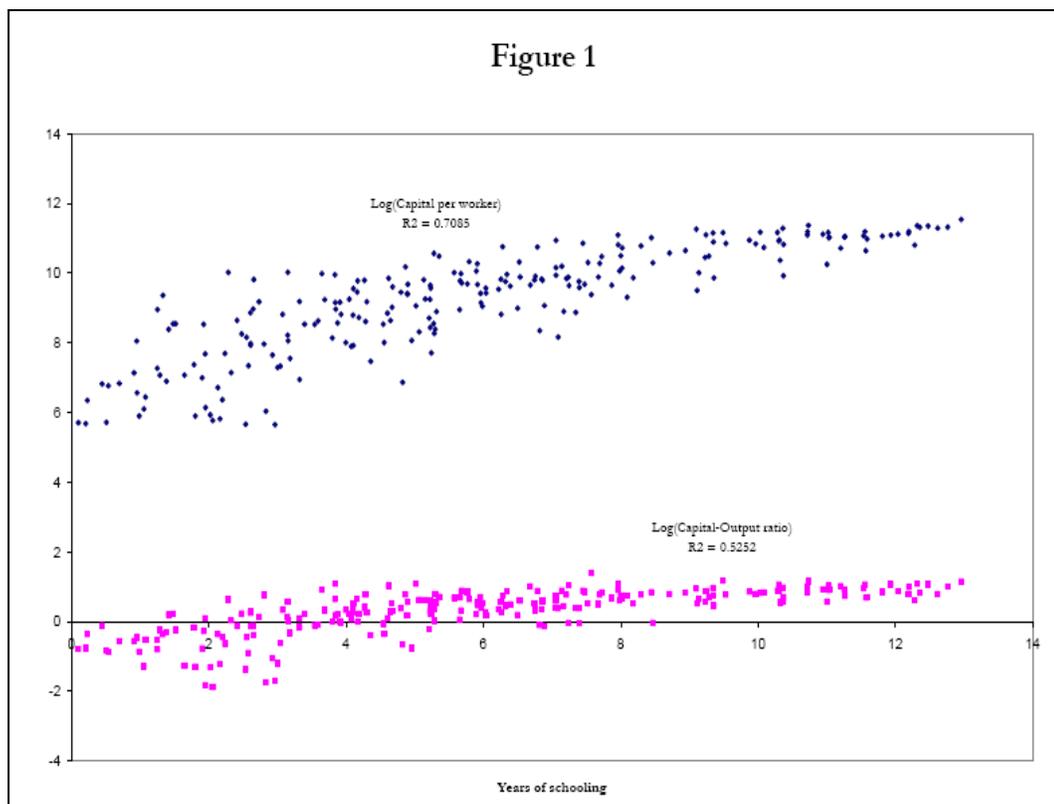
So why should collinearity affect more human capital than physical capital? Davidson and MacKinnon (1993, pp. 181-186) suggest a simple procedure to find out the variable whose significance is more affected by the presence of collinearty. Suppose that x_1 and x_2 are two collinear regressors and X represents the remaining regressors of the model to be estimated. If an OLS regression of x_1 on x_2. and X produces a higher R^2 than a regression of x_2 on x_1 and X then it is the significance of x_1 in the estimated model that will be more affected. The reason is that in this case x_1 is relatively well explained by x_2 and X. In the present context, if it is true that collinearity is the cause of the low significance of S, a regression of S on ln$k$ and time dummies should produce a higher R^2 than a regression of ln$k$ on S and time dummies. The R^2 of these two auxiliary regressions (not reported) are respectively 0:72 and 0:70. Although the difference is small it is consistent with the fact that physical capital is significant while human capital is not[7].

One way to get rid of the collinearity problem is to reparametrize the model. By subtracting $\alpha \ln y$ from both sides of equation (6) and dividing by $(1 - \alpha)$ we obtain,

$$\ln y_{it} = \frac{\alpha}{1-\alpha} \ln \left(\frac{k}{y} \right)_{it} + r S_{it} + \frac{u_{it}}{1-\alpha} \qquad (8)$$

where $u_{it} \equiv \eta_i + \tau_t + \epsilon_{it}$. The corresponding version in first differences is,

$$\Delta \ln y_{it} = \frac{\alpha}{1-\alpha} \Delta \ln \left(\frac{k}{y} \right)_{it} + r \Delta S_{it} + \frac{\Delta u_{it}}{1-\alpha} \qquad (9)$$

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[7] Obviously this is just a qualitative result. There is no theory that indicates how large the di¤erence between the R2 of the auxiliary regressions must be to cause only one of the regressors to lose its signi.cance. So we cannot say that the di¤erence found here is "large" or "small".

The lower scatter in Figure 1 represents the relationship between years of schooling and the logarithm of the capital-output ratio. Although the correlation between $\ln(k/y)$ and S is still high it is lower than correlation between ln$k$ and S.

This reparametrization introduces additional endogeneity problems as the income level appears now in both sides of the equation. Topel (1999) has already estimated equations (8) and (9) by constraining the coefficient α to specific values (he chooses 0:35 and 0:5) or by assuming that the ratio k/y is constant for each country over time. Under this last assumption he treats k/y as a country specific effect and estimates (8) and (9) by fixed-effect and OLS methods.

Table 3 presents unconstrained estimates for the system (8 - 9). The OLS estimation in levels (column 1) results in a coefficient r equal to 21:7% and highly significant. This value reflects the return on schooling that allows for physical capital to adjust to changes in S so that the ratio k/y stays constant and therefore it can be seen as a long-term return on schooling. The Mincerian-comparable return of one additional year of schooling .i.e. the increase in income per worker that would be obtained without an endogenous response of k.is $0.217 \times (1 - 0.181) = 17.8\%$. This figure is still very large. Measurement error problems in both k and y variables may be the cause of the implicit low or even negative (column 2) estimates obtained for α. In fact, any measurement error affecting y will lead to a spurious negative correlation between ln y and $\ln(k/y)$. Besides, if k is also measured with error, OLS methods will yield estimates for α biased towards zero. Note however that by dealing with the collinearity problem, the OLS estimation in both levels and in first-differences produce positive and significant coefficients associated with schooling.

Table 3

The effect of schooling after dealing with collinearity

Equation estimated is: $\ln(y_{it}) = \dfrac{\alpha}{1-\alpha}\log\left(\dfrac{k}{y}\right)_{it} + rS_{it} + \dfrac{\eta_i}{1-\alpha} + \dfrac{\tau_t}{1-\alpha} + \dfrac{\varepsilon_{it}}{1-\alpha}$

	OLS (Levels) (1)	OLS (Differences) (2)	GMM (Levels) (3)	GMM (Differences) (4)	GMM (System) (5) - Baseline
Observations	313	230	313	230	313
Log(k/y)$_{it}$	0.221[b] (0.112)	-0.213[b] (0.105)	0.865[b] (0.422)	-0.126 (0.353)	0.859[b] (0.349)
S$_{it}$	0.217[a] (0.024)	0.093[b] (0.044)	0.150[b] (0.064)	-0.246 (0.158)	0.155[a] (0.054)
Implicit α	0.181	-0.271	0.464	-0.144	0.462
Mincerian return	0.178	0.118	0.080	-0.281	0.083
Sargan (p-values)	–	–	0.363	0.072	0.176

Notes: Time dummies included (not reported). Robust standard errors in parenthesis. 2-step GMM coefficients (one-step standard errors). 10-year observations for the period 1960-1990. y$_{it}$ is GDP per worker, from Summers and Heston, PWT 5.6; S$_{it}$ is years of schooling from Cohen and Soto (2001); k$_{it}$ is stock of physical capital per worker from Easterly-Levine (2001).
a, b, c: coefficients are significant at a 1%, 5% and 10% respectively.

While the GMM estimation in first-differences results in implausible (but non-significant) coefficients for both variables, the estimation in levels produces significant coefficients for both the capial-output ratio and years of schooling (column 3). The estimated implicit share of physical capital in total income (46:4%) is slightly larger than its typical value while the estimated social Mincerian return (8%) falls in the range observed in micro studies. System GMM estimates display similar results. The capital share is estimated at $0.859/1.859 = 46.2\%$ and the semi-elasticity of income with respect to years of schooling is equal to $0.155 \times (1 - 0.462) = 8.3\%$.

These returns are larger than those reported by Topel (1999; table 2, column 5) who, conditioning on a physical capital share of 35%, finds a marginal effect of schooling equal to 5.5%. On the other hand, the results found here imply that the marginal effect of schooling at a macro level is slightly lower than the standard private return observed in labour studies. For instance, from around seventy country-level studies, Psacharopoulos (1994) and Psacharopoulos and Patrinos (2002) report respectively a world average Mincerian return equal to 10.1% and 9.7%. Consequently, if micro returns are taken at face value, these results point to an absence of externalities to schooling[8].

Alternatively, if an increase in the level of human capital induces an expansion of physical capital the total macro return to schooling would be higher than the typical private one. Indeed, under the assumption of a constant capital-output ratio the total return to schooling would fall in the range 15%-15:5% depending on the method of estimation. However, this larger long-term Mincerian return does not represent externalities in the sense of Lucas (1988). In Lucas.s model, the social marginal product of human capital is higher than the private marginal return in the short-run .i.e. without taking into consideration any hypothetical endogenous response of physical capital. Therefore in order to analyse if these externalities exist in the real world we must compare this short-run return with the typical micro Mincerian coefficient. And the results of Table 3 point to the absence of this kind of externalities. On the other hand, what Table 3 does show is that, contrary to the findings of most of the recent empirical literature, the neoclassical approach to human capital is strongly supported by the evidence, and years of schooling present a return surprisingly close to the standard value found in micro studies.

Return Heterogeneity

The previous section assumes, consistently with the earlier literature, that the macro return on schooling is constant across countries. However this view has been questionned recently. There are theoretical and empircal reasons to believe that the social returns on schooling differ across countries. On the theoretical ground, the hypothesis that human capital has decreasing returns with the level of schooling has been put forward by Bils and Klenow (2000). Similarly, Hall and Jones (1999) and Caselli (2005) assume decreasing Mincerian returns to build human capital stocks for income accounting excercices.

The decreasing return hypothesis is in fact motivated by the private Mincerian returns reported by Psacharopoulos (1994) and Psacharopoulos and Patrinos (2002). They report wide di¤erences across world regions with, on average, richer and better educated countries having lower private returns. Note though this is far from being a perfect regularity and there are a number of exceptions. For instance, according to Psacharopoulos and Patrinos the latest estimates for Japan and Singapore are respectively 13.2% and 13.1% whereas those for South Africa and Egypt are respectively 4.1% and 5.5%. Although private and social Mincerian returns are not necessarily connected, it is still possible that they are. If so, the observed heterogeneity in labour studies would point to important differences in Mincerian returns at the aggregate level.

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[8] There is a huge literature on whether these micro returns are properly measured but this topic goes far beyond the scope of this paper. So the 10.1% result is taken for granted and is used only for comparison with the macro results obtained in this paper.

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Other piece of empirical evidence pointing to return heterogeneity is provided by Hanushek and Kimko (2000). They show substantial differences in schooling quality across countries, which may also be a cause of return heterogeneity. Pritchett (2001) argues that the low quality of schooling is one major cause of the lack of signi.cance of schooling variables in growth regressions[9].

Under the heterogeneity hypothesis, each country.s long-run return ri can be expressed as:

$$r_i = \bar{r} + \nu_i \qquad\qquad (10)$$

where $\bar{r}$ is the world average return and ν_i is the country deviation from the world average.

It is often stated that heterogeneity is not a problem in itself since the estimated parameter can be interpreted as the average across countries, i.e. $\bar{r}$. But, this is not necessarily the case. In order to assess the effects of return heterogeneity it is convenient to illustrate its consequences for cross-section regressions. When the income level is regressed on years of schooling a potential source of bias of the estimated $\bar{r}$ emerges as the term $\nu_i S_i$ is present in the residual of the equation. The sign of the bias introduced by this term depends on whether ν_i and S_i are positively or negatively correlated. According to the micro evidence presented by Psacharopoulos (1994) and Psacharopoulos and Patrinos (2002) the return on years of schooling is lower in countries with higher levels of education, so this would suggest that the correlation $\sigma_{\nu,S}$ between ν_i and S_i is negative. This, in turn, would imply that methods of estimation that do not account for differences in returns across countries produce estimates of $\bar{r}$ biased downwards.

On the other hand, it may be the case that higher levels of schooling are not matched by higher aggregate productivity, especially in developing countries, as put forward by Pritchett (2001, 2003). Moreover, Hanushek and Kimko (2000) highlight that schooling quality differs considerably among countries and in general it is lower in the poorer and less educated ones. Therefore, since more educated countries benefit from higher schooling quality their r_i should be relatively high. In that case $\sigma_{\nu,S}$ would be positive and the estimated $\bar{r}$ would be biased upwards. Of course this reasoning neglects the endogeneity of S inherent in growth regressions, which also bias the estimated $\bar{r}$ upwards. Note also that instrumental variable methods do not solve the endogeneity problem introduced by return heterogeneity since any instrument that is correlated with S_i is also correlated with $\nu_i S_i$.

To assess the effects of heterogeneity in panel regressions let's decompose country i's years of schooling into its sample average $\bar{s}_i$ and the deviation d_{it} from the average (i.e. $S_{it} = \bar{s}_i + d_{it}$). Suppose that the return on schooling is given by (10). Then equation (8) can be rewritten as,

$$\ln y_{it} = \frac{\alpha}{1-\alpha} \ln \left(\frac{k}{y}\right)_{it} + \bar{r}S_{it} + v_i\left(\bar{s}_i + d_{it}\right) + \frac{u_{it}}{1-\alpha} \qquad (11)$$

Now the source of bias comes from the term $v_i d_{it}$ (the term $v_i \bar{s}_i$ is part of the country's specific effect). Neglecting other possible sources of bias it can readily be shown that the sign of the bias introduced by the presence heterogeneity is equal to the sign of $E\left(v_i \sigma_i^2\right)$, where σ_i^2 is country i's variance of years of schooling. Therefore, if countries with lower (higher) than average returns have more volatile levels of schooling then $\bar{r}$ will be estimated with a negative (positive) bias. As before, the use of instruments does not solve the bias problem since any variable correlated with S_{it}

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[9] Note however that if better quality does have an impact on the return on education then countries with higher levels of schooling (which are also those with better quality) should present higher returns. This is contradicted by Psacharopoulos.s data.

is also correlated with $v_i d_{it}$. Conversely, if there is no correlation between return and volatility of education, then return heterogeneity would not bias the estimates of the average world return $\bar{r}$.: The appendix reports the observed σ_i^2 for the countries in the sample.

A preliminary check of whether the heterogeneity in returns on schooling is biasing the estimated average return consists in analysing the exogeneity of instruments used in GMM estimation. The Sargan tests of Table 3 reject the hypothesis of endogeneity of the instruments, which suggests that heterogeneity is not introducing bias. However the low p-values may be an indication that the instruments are in fact not exogenous.

Micro Returns

An alternative way to deal with heterogeneity is to eliminate the source of bias by explicitly accounting for the term $v_i S_{it}$ in the regressions. If private returns p_i and aggregate returns are somehow related, the excess private return may be a good proxy for the excess macro return on schooling. In the absence of externalities to education $p_i \equiv (1 - \alpha) r_i$. Thus under this assumption v_i would be equal to the excess private return devided by $(1 - \alpha)$. But even if this extreme case does not apply, the private returns may contain some information about the aggregate returns on schooling. This suggests the use of micro evidence as a proxy for v_i.

We can build the excess private return from the returns reported by Psacharopoulos (1994) and Psacharopoulos and Patrinos (2002)[10]. The private Mincerian returns obtained in this way are reported in the appendix. Note that the number of countries available falls to 55. The variance of years of schooling and the excess private return of each country are plotted in figure 2. The correlation between both variables is virtually zero. Thus if the excess private returns calculated here are a good proxy of the excess social returns, the figure suggests that in panel regressions there is no bias in the estimation of $\bar{r}$ induced by return heterogeneity.

Table 4 reports the regressions when private returns are used as proxies for social returns. The first regression shows the estimation of (11) without accounting for heterogeneity. This is the same regression as in table 3 but for the smaller sample of 55 countries for which private Mincerian coefficients are available. The results are similar to those obtained with the full sample, although the Mincerian return falls to 7.2%. The low Sargan statistic hints at high heterogeneity among the countries in this smaller sample. Regression 2 incorporates the excess private return multiplied by schooling, which turns out to have a negative and significant coefficient. Recall that the expected coefficient on this variable, assuming that private and social returns are equal is $1/(1 - \alpha)$.

These results show that the data reported by Psacharopoulos are a bad proxy for excess social returns. There are are least two possible reasons for this. First, it may be the case that private and social returns to education are unrelated, as claimed by Pritchett (2003). This may be caused by educational screening and signaling in the labour market, which affects a worker's salary but not his productivity. An alternative explanation is that the returns reported by Psacharopoulos are too noisy. An example of this is Jamaica, which has a micro-Mincerian return of 28.8% .or 4.5 standard deviations higher than the sample average. This is clearly an outlier that may be having a non negligible effect on the estimates of regression 2. Jaimaca is dropped from the sample in regression 3. The major effect of this is the lost of significance of the excess private return. This is consistent with the fact that the high return of Jamaica is distorting the previous estimates. However, the other results are qualitatively the same as in regression 2. Namely, private returns still appear with the opposite sign and the Sargan test is too low. Thus, in summary, these results suggest that the excess private returns implicit in Psacharopoulos data are in fact a bad proxy for excess social returns.

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[10] The average of both papers are computed for each country.

Table 4

Accounting for Heterogeneity of Mincerian Returns

Dependent variable is $\ln(y_{it})$

(System GMM estimation)

	(1)	(2)	(3)	(4)	(5)
Observations	214	214	210	214	
$ln(k/y)_{it}$	0.928 [b]	0.976 [b]	0.904 [b]	0.661 [c]	
	(0.432)	(0.405)	(0.434)	(0.347)	
S_{it}	0.139 [a]	0.089 [c]	0.094 [c]		
	(0.051)	(0.050)	(0.054)		
Excess private return $\times$ S_{it}		-0.612 [a]	-0.651		
		(0.020)	(0.449)		
S_{it} (Low priv. return)				0.129 [a]	
				(0.040)	
S_{it} (Moderate priv. return)				0.138 [a]	
				(0.050)	
S_{it} (High priv. return)				0.082	
				(0.056)	
Implicit α	0.481	0.494	0.475	0.398	
Social Mincerian Return	0.072	0.045	0.049	0.072	
Sargan (p-values)	0.016	0.041	0.027	0.073	

Notes:

a, b, c: coefficients are significant at a 1%, 5% and 10% respectively.

As an alternative way to exploit the information coming from labour studies, the sample can be devided into different groups of countries according to their private returns. This is a natural way to proceed if micro and macro returns are correlated. This procedure has, in addition, the advantage that it avoids relying too heavily on the numbers reported by Psacharopulos. Regression 4 shows the estimated macro returns for three different groups: countries with low, moderate and high private returns. The group with low and moderate private returns display social returns respectively equal to 7.8% and 8.3%. These are not statistically different from the observed private returns for these groups (respectively 6:3% and 9:5%). By contrast, countries with high private returns have, paradoxically, the lowest macro return. It is estimated at 4.9%, which is almost 10 percentage points lower than their average private return and non-significant. These results are summarised in table 5. Beyond estimation error, there is no obvious reason for these findings. One possible interpretation is that in countries where the private return on schooling is relatively high .for instance, due to important screening effects -a sub-optimally large share of the population goes to formal education. There is some evidence in favour of the screening hypothesis for specific countries as surveyed by Riley (2001). But the lack of more systematic evidence prevents exploring further this hypothesis. On top of the paucity of evidence, this hypothesis does not say why screening effects are more important in some countries than in others.

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Table 5

Mincerian returns by group of countries

Private return	Countries	Average private return	Social return
Up to 0.08	17	0.063	0.078
Between 0.08 and 0.11	22	0.095	0.083
Higher than 0.11	16	0.147	0.049

Private returns from Psacharopoulos (1994) and Psacharopoulos and Patrinos (2002).

The weighted average social Mincerian return for the three groups is 7.2% or almost 3 percentage points lower than the average private return. Supposing that Psacharopulos data properly measure the marginal effect of schooling on income, these results point to an absence of positive externalities of education. Moreover, these .ndings show that there is no obvious relationship between micro and macro returns. More specifically, countries with relatively large micro-returns have lower than average macro-retruns.

Regarding the effects of heteogeneity on the estimated average macro return, table 4 provides mixed evidence. On the one hand, the point estimates that ignore heterogeneity (regression 1) are identical to those that best acknowledge it (regression 4). This suggests that the heterogeneity in social Mincerian returns across countries does not bias the estimated average return obtained when heterogenity is ignored. But on the other hand, the low Sargan statistic may be an indication that heterogeneity is in fact a¤ecting the estimates. Finally, it is important to highlight that regardless of whether the average return is estimated with a bias or not, it seems that return heterogeneity across countries is considerable. Thus even a good estimate of the "world" average return on schooling may be misleading insofar as the social return in each country really is.

Quality of Education

One candidate to explain heterogeneity in social Mincerian returns across countries is the quality of education. As noted above, Pritchett (2001) justify the lack of significance of schooling in cross-country growth regressions by the low quality of education in developing countries. In similar regressions Hanushek and Kimko (2000) find that their indicators of education quality have a strong explanatory power for growth. As they argue, one possible reason for the implausible large coeffi cient on quality that they find is that quality determines the long-run income level.

To assess the effect of quality q_i on income levels we first compute the simple average of the two quality scores reported by Hanushek and Kimko (2000, pp. 1206-1207) for each country available. In order to facilitate the interpretation of the results the measure of quality is scaled to 1 for the country with the highest score in the sample (Singapore). The q_i values obtained in this way are shown in the appendix. Then we can estimate the effect of quality by multiplying q_i by the number of years of schooling. This approach assumes that quality and quantity can be substituted by each other. On the other hand, multiplying the quality indicator by years of schooling captures the notion that the productivity of schooling increases with quality. This is a departure from Hanushek and Kimko who assume that the impact of schooling on growth is independent of quality. Under this approach the equation to be estimated is,

$$\ln y_{it} \;=\; \frac{\alpha}{1-\alpha}\ln\left(\frac{k}{y}\right)_{it} + rq_i^\gamma S_{it} + \frac{u_{it}}{1-\alpha} \tag{12}$$

where γ is a measure of the weight of quality in the determination of the return on schooling.

Table 6 presents the main effects of quality of education for different values for γ. The first regression is the baseline estimation with the smaller sample of 67 countries for which the data on education quality and years of schooling is available. In this regression years of schooling is not weighted by quality (or equivalently $= 0$). There are no important differences with respect to the full-sample regression (see regression 5 of table 3). Namely, the point estimate for the social Mincerian return is virtually the same as before (8.4%). In regression 2, where $\gamma = 1$, the quality-weighted level of schooling enters with a larger and highly significant coefficient. The social Mincerian return implied in regression 2 for a country with q = 1 is $(1 - 0.632/1.632)\times 0.164 \;=\; 0.1$. Thus the sample average Mincerean return is simply 0.1 times the average quality across countries. The resulting return is 6.6%, which implies that neglecting education quality yields a return biased upwards by 1.8 points in this particular specification. Regressions 3 and 4 report the results for larger values of γ. As expected, the world average Mincerian return decreases as the importance of quality is assumed to increase.

Table 6

The effects of quality of education

Dependent variable is ln(y_it)

(System GMM estimation)

	(1) $\gamma = 0$	(2) $\gamma = 1$	(3) $\gamma = 3$	(4) $\gamma = 10$	(5)	(6)
Observations	257	257	257	257	257	257
$ln(k/y)_{it}$	0.726 [c] (0.416)	0.632 (0.433)	0.575 (0.424)	0.933 [b] (0.386)	0.406 (0.381)	0.643 [c] (0.361)
$q^\gamma S_{it}$	0.145 [b] (0.057)	0.164 [a] (0.050)	0.178 [a] (0.046)	0.168 [a] (0.054)		
S_{it} (Low q)					0.011 (0.080)	0.024 (0.072)
S_{it} (Moderate q)					0.122 [c] (0.064)	
S_{it} (High q)					0.138 [a] (0.045)	
S_{it} (Mode. & high q)						0.123 [b] (0.052)
Implicit α	0.421	0.387	0.363	0.483	0.289	0.391
Average Mincerian return*	0.084	0.066	0.040	0.010	0.076	0.062
Mincerian return for country with q = 1	0.084	0.100	0.113	0.087	0.098	0.075
Sargan (p-values)	0.084	0.082	0.105	0.076	0.156	0.177

Notes:
* Return on schooling with quality = 1, multiplied by the average quality in the sample (0.66).

a, b, c: coefficients are significant at a 1%, 5% and 10% respectively.

We can measure the difference between the social returns in table 6 and the private returns reported by Psacharopoulos in order to obtain a crude assessment of the externality to education in each country. The implicit externalites assuming $\gamma = 1$ are shown in the appendix. In general, the high private returns observed in some countries are not accompanied by equivalently large social returns. This is so because, in general but not always, countries with high private retrurns on education have relatively low levels of quality (figure 2). This imples a low social return in these countries under the especification that we have assumed. The sample average of the macro Mincer coefficient is 3 percentage points lower than the private return.

One problem about the regressions 1-4 is that education quality is assumed to affect in a too specific way the return on schooling. Instead of multiplying quality by years of schooling a more parsimonious representation may be obtained by splitting the sample of countries according to their quality levels. Then a separate estimate can be obtained for each group of countries. Such estimation has the advantage that it does not need to specify how quality affects the return on schooling. But on the other hand, this approach has problems of its own since it supposes that all the countries in a group have the same return. Ignoring this last caveat, regression 5 shows the estimates when countries are split into three quality groups[11]. Countries in the low quality group have a low and non-significant coefficient on schooling. On the other hand countries with "moderate" and "high" quality have a significant coefficient on years of schooling. The implicit Mincerian returns for these countries are respectively 8.7% and 9.8%. However these are likely to be upper bounds since the share of physical capital is implausibly low in this regression. Note also that the Sargan statistic increases significantly, which may be an indication that regression 5 is dealing better with heterogeneity than regressions 1-4. Finally, regression 6 groups together countries with moderate and high quality of education. The coefficient on the k/y ratio is now significant at a 10% level and the implicit share of physical capital raises to 39%. This causes the Mincerian return of countries with better quality to fall to 7.5%. But the coefficient on schooling is still highly significant. By contrast, the return for countries with low quality is 1.5% and is not significally different from zero.

To summarise these findings, schooling quality appears an important determinant of the social return on schooling. The results of table 6 show that ignoring quality of schooling leads to an overestimation of the average macro Mincer coefficient. The magnitude of this overestimation depends on how quality enters in the regressions. According to the regression 6, which yielded the largest Sargan test, this overestimation is around 2 percentage points

Conclusions

This paper has revisited the .ndings of earlier empirical studies on schooling and income, a literature that has failed to find a role for schooling as an input in a standard production function. One particular issue that undermines the estimates of the coefficient on schooling in panel regressions is the collinearity between years of schooling and physical capital stocks. It is shown that when problems of model specification are properly dealt with, years of schooling fit well in a neoclassical production function. In the borderline panel regression for 83 countries the coefficient on schooling is highly significant and the point estimate for the macro Mincer return is 8.3%. This coefficient must not be interpreted as a internal rate of return of schooling but as the causal effect of schooling on income per worker. With this caveat in mind the estimates suggest the absence of externalities to education, which is consistent with the findings based on wage regressions as in Acemoglu and Angrist (2001) or Ciconne and Peri (2005).

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[11]The groups are formed by countries with quality lower than 0:45 (14 countries), between 0:45 and 0:67 (19 countries) and larger than 0:67 (34 countries). These thresholds were determined by the ocurrence of important di¤erences in quality levels between two consecutive countries (when ranked by quality). This seems more reasonable and produced more sensible results than the option of having groups with the same number of countries.

This number is an estimate of the cross-country average macro return on schooling. However there seems to be substantial return heterogeneity across countries. Paradoxically, countries where the micro Mincer coefficients are relatively high display on average a low and non significant macro return. The other countries in the sample show social returns in line with the private ones. One possible explanation for this is that screening effects are pushing up the private returns on schooling in some countries. If the education premium is high due to screening, then workers with low ability will be encouraged to invest in formal education. In this case high private returns on education may be accompanied with low macro Mincer coefficients. Labour studies, however, have not produced robust evidence about these kind of e¤ects.

Paralleling these findings, schooling quality appears as a significant determinant of disparities in the social return of schooling across countries. When quality is taken into acccount, the estimated return on schooling depends on how the quality score enters in the regressions. For instance, when it multiplies the number of years of schooling the average social return falls to 6.6%. Under this setup the country with the highest quality in the sample (Singapur) has a social return on schooling equal to 10%, whereas in the country with the lowest quality (Iran) the macro Mincer coefficient is only 3%. If instead of explicitily including the quality score in the regressions, countries are grouped according to their quality lelvels and a separate return is estimated for each group, similar results emerge. More specifically, the return in a group of countries with low schooling quality is virtually equal to zero. In countries with moderate and high levels of quality the average return is 7.5%. The average return for all three groups of counties obtained in this way is 6.2%.

The previous results show that when return heterogeneity is not taken into account in these regresssions, the average Micerian return is estimated with a positive bias of about 2 percentage points. Another implication of heterogeneity is that income accounting excercices that assume similar Mincerian returns may be seriously understimating the role of human capital in explaining income di¤erences across countries.

This leads us to the question of what allows countries to improve schooling attainment. Most empirical studies try to .nd out what the income elasticity to schooling is. But this provides precious little guidance on the policies that may lead to higher levels of schooling. One interesting line of research is the role of health and life expectancy in the private decisions on schooling investment. In this respect, the theoretical works of Boucekkine, de la Croix and Licandro (2001) and of Kalemli-Ozcan, Ryder and Weil (2000), where increases in life expectancy raise investment in human capital are an important step ahead. Complementary empirical studies on this field would help to back up this hypothesis.

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APPENDIX: Data Summary

Country Name	Average Years of schooling	Standard Deviation	Average Private Mincerian return	Social Mincerian return	Externality	Quality
Algeria	3.25	1.64		0.044		0.438
Argentina	7.03	0.39	0.103	0.071	-0.032	0.711
Australia	11.45	1.28	0.067	0.083	0.016	0.833
Austria	9.70	1.03	0.094	0.085	-0.009	0.854
Bangladesh	2.43	0.16				
Belgium	8.74	0.99		0.086		0.858
Benin	0.91	0.29				
Bolivia	5.39	1.96	0.089	0.039	-0.050	0.385
Brazil	4.39	1.71	0.147	0.055	-0.092	0.548
Burkina Faso	0.21	0.02	0.096			
Burundi	0.92	0.02				
Cameroon	3.00	0.80		0.063		0.632
Canada	10.86	1.51	0.071	0.079	0.009	0.794
Central African Republic	1.41	0.34		0.039		0.385
Chile	7.64	1.24	0.120	0.040	-0.080	0.397
China	4.09	0.64	0.086	0.096	0.010	0.962
Colombia	4.73	0.74	0.140	0.056	-0.084	0.565
Costa Rica	4.44	0.98	0.097	0.069	-0.028	0.686
Cote d'Ivoire	1.50	0.63	0.201			
Cyprus	6.75	0.84	0.081	0.069	-0.012	0.688
Denmark	10.43	0.88	0.045			
Dominican Republic	3.75	0.74	0.094	0.060	-0.034	0.597
Ecuador	5.73	1.22	0.118	0.058	-0.060	0.581
Egypt, Arab Rep.	2.63	2.28	0.052	0.041	-0.011	0.408
El Salvador	3.17	0.94	0.087	0.037	-0.049	0.373
Ethiopia	0.28	0.03	0.080			
Fiji	6.22	1.00		0.084		0.840
Finland	8.76	2.17	0.082	0.084	0.002	0.842
France	8.61	1.87	0.100	0.086	-0.014	0.856
Gabon	3.53	0.89				
Ghana	3.56	1.29	0.078	0.040	-0.038	0.398
Greece	7.28	1.08	0.052	0.078	0.026	0.777
Guatemala	2.53	0.78	0.149			
Guyana	6.26	0.89		0.076		0.756
Honduras	3.51	1.06	0.135	0.043	-0.092	0.428
India	2.22	0.55	0.078	0.033	-0.045	0.330
Indonesia	4.22	1.69	0.120	0.063	-0.057	0.629
Iran, Islamic Rep.	2.04	1.39	0.116	0.030	-0.086	0.304
Iraq	1.43	0.89		0.044		0.442
Ireland	8.43	0.76		0.076		0.760
Italy	7.42	1.52	0.025	0.073	0.048	0.731
Jamaica	6.48	1.61	0.288	0.072	-0.216	0.721
Japan	10.75	0.84	0.099	0.098	0.000	0.981
Jordan	6.14	6.37		0.063		0.635
Kenya	3.48	1.61	0.162	0.042	-0.120	0.421
Korea, Rep.	7.98	5.19	0.121	0.089	-0.031	0.892
Madagascar	2.18	0.36				
Malawi	2.49	0.23				
Malaysia	5.50	3.17	0.094	0.079	-0.015	0.794

Country Name	Average Years of schooling	Standard Deviation	Average Private Mincerian return	Social Mincerian return	Externality	Quality
Mali	0.65	0.07				
Mauritius	4.93	2.17		0.081		0.812
Mexico	5.46	1.31	0.109	0.056	-0.052	0.562
Morocco	1.37	0.46	0.158			
Mozambique	1.28	0.28		0.041		0.406
Netherlands	9.67	0.84	0.069	0.088	0.019	0.880
New Zealand	10.15	0.63		0.093		0.929
Nicaragua	3.52	1.41	0.109	0.040	-0.069	0.400
Nigeria	1.59	0.36		0.057		0.568
Norway	10.81	1.55	0.055	0.089	0.034	0.887
Panama	6.14	1.68	0.137	0.069	-0.068	0.690
Paraguay	4.94	0.52	0.115	0.061	-0.054	0.606
Peru	5.84	1.45	0.081	0.061	-0.020	0.614
Philippines	5.79	1.04	0.103	0.053	-0.050	0.528
Portugal	4.69	1.24	0.093	0.069	-0.024	0.686
Senegal	1.24	0.30				
Sierra Leone	1.94	0.53				
Singapore	6.23	0.34	0.133	0.100	-0.033	1.000
South Africa	4.98	0.24	0.041	0.075	0.034	0.751
Spain	7.05	0.99	0.072	0.079	0.007	0.788
Sweden	10.49	1.63	0.059	0.081	0.023	0.815
Switzerland	12.05	0.56	0.077	0.092	0.015	0.921
Syrian Arab Republic	4.27	1.21		0.048		0.481
Thailand	4.03	2.23	0.110	0.067	-0.043	0.669
Trinidad and Tobago	7.92	0.96		0.068		0.676
Tunisia	2.54	0.52	0.080	0.064	-0.016	0.640
Turkey	3.65	1.34		0.063		0.632
Uganda	1.93	0.24				
United Kingdom	10.82	1.46	0.068	0.091	0.023	0.906
United States	11.56	0.88	0.099	0.070	-0.029	0.701
Uruguay	6.47	0.78	0.097	0.077	-0.020	0.766
Venezuela, RB	4.96	1.52	0.089	0.059	-0.030	0.590
Zambia	4.29	0.85		0.052		0.522
Zimbabwe	5.05	1.75		0.059		0.588
Countries	83	83	55	67	49	67
Mean	5.230	1.131	0.100	0.066	-0.031	0.660
Standard Deviation	3.123	0.958	0.042	0.018	0.047	0.182

Measuring Returns to Education in Turkey

B. Müge Tunaer
Dokuz Eylül University

Yaprak Gülcan
Dokuz Eylül University

The purpose of this paper is to examine the returns to individually acquired education in Turkey. In contrast to the traditional neo-classical growth theory models, technological progress is embedded within the new endogenous growth models emphasising the endogenous determination of growth process. Thus, human capital stock is incorporated as an endogenous determinant of growth rate into the model that is highly associating the human capital accumulation with the innovative capacity and productivity. With the development of human capital theory, the educational level of the population as one of the key determinants in economic growth, is considered to be affected by the returns to education. The key relationship for the estimation of returns to education was derived by Mincer (Mincer, 1974). Since then, the topic has become centre of focus, and a large number of studies have estimated returns to education. One of the most comprehensive surveys by Psacharopoulos covers the cross – country returns to education estimations for 60 countries, reveals that the developing countries possessed the highest return to an additional year of schooling (1994). Recent country specific studies, on the other hand, while providing evidence on the decreasing returns to education in Norway (Haegeland et. al. 1999), and Austria ( ), empirical findings for China (Heckman & Li, 2003), and Italy (Brunello et. al., 2000) suggest increasing returns to education. Furthermore, returns to education estimations reveal heterogenous results varying accordingly with the degree programmes and gender in Britain (Sloane & O'Leary, 2004), and West Germany (Lauer & Steiner, 2000).

Despite the huge literature on the estimation of returns to education in terms of both cross – country and country specific analysis, studies concerning Turkish case remain limited (Tansel, 1994, 1999). This paper aims to make an update contribution to the literature in Turkey. Role of the educational level (primary, secondary, and higher education) in explaining earnings dispersion is analysed by estimating standard Mincerian equation, and using a national level household budget survey data. Estimating earnings equations for 1994 and 2003, preliminary findings demonstrate that returns to education have been instable and changing across the different sectors of the economy. Even though the education has been an important determinant of wage dispersion in Turkey, the findings reveal substantial heterogeneity in returns to different educational levels.

Introduction

Human capital investment as the source of economic growth and development has been the focus of considerable debate in the economics literature. In contrast to the traditional neo-classical growth theory models, technological progress is embedded within the new endogenous growth models emphasising the endogenous determination of growth process. Thus, human capital stock is incorporated as an endogenous determinant of growth rate into the model that is highly associating the human capital accumulation with the innovative capacity and productivity. With the development of human capital theory, the educational level of the population as one of the key determinants in economic growth, is considered to be affected by the returns to education. The key relationship for the estimation of returns to education was derived by Mincer (Mincer, 1974). Since then, the topic has become centre of focus, and a large number of studies have estimated returns to education. One of the most comprehensive surveys by Psacharopoulos covers the cross – country returns to education estimations for 60 countries, reveals that the developing countries possessed the highest return to an additional year of schooling (1994). Recent country specific studies, on the other hand, while providing evidence on the decreasing returns to education in Norway (Haegeland et. al. 1999), and Austria (Fersterer & Winter-Ebmer, 1999), empirical findings for China (Heckman & Li, 2003), and Italy (Brunello et. al., 2000) suggest increasing returns to education. Furthermore, returns to education estimations reveal heterogeneous results varying accordingly with the degree programmes and gender in Britain (Sloane & O'Leary, 2004), and West Germany (Lauer & Steiner, 2000).

Despite the huge literature on the estimation of returns to education in terms of both cross – country and country specific analysis, studies concerning Turkish case remain limited (Tansel, 1994, 1999). This paper aims to make an update contribution to the literature in Turkey. Role of the educational level (primary, secondary, and higher education) in explaining earnings dispersion is analysed by estimating standard Mincerian equation, and using a national level household budget survey data. Estimating earnings equations for 1994 and 2003, preliminary findings demonstrate that returns to education have been instable and changing across the different sectors of the economy. Even though the education has been an important determinant of wage dispersion in Turkey, the findings reveal substantial heterogeneity in returns to different educational levels.

The research is organised under three section. First section briefly describes the data set used, and the econometric specifications used in estimating the impact of education on personal earnings, net of any transfers from the state and any taxes paid. Second section reveals and discusses the estimation results. The third and last section makes the concluding remarks.

Data and Methodology
Data Set

Micro data used in this research are drawn from Household Budget Surveys for the years 1994, 2003, and 2004. Household Budget Survey is a representative sample of whole Turkish population, covering approximately 8600 households. Survey contains information both on family composition (household data) and on individuals. The sample used in this study is restricted to full – time working, non – agricultural employees aged from 15 to 58 for females and 60 for males.

Raw data used in this research include; gender, age, highest completed school degree, gross yearly earnings, gross monthly earnings, number of months employed per year, average weekly hours of work, occupation, and sector. Additional data estimated by using the raw data include; dummies for the educational degrees, years of schooling, potential work experience, and average hourly earnings. A distinction is made between a total of five educational levels. Illiterate and those never went to school belong to the reference group for the dummies. Starting level is 8 – year elementary school for the years 2003, 2004, and 5 – year prior to the educational reform in 1996. The next level refers to junior school which is categorised under the general school and vocational

school, each lasting minimum 3 years. Higher education comprises both vocational high schools, and university degrees (= 2 to 4 years of schooling). Postgraduate studies comprising MSc, MA, and doctoral studies associated with two or more years of schooling after the university education. Since the actual years used by the individual for completing the degree are not known, years of schooling data is estimated on the basis of minimum years required to complete each educational degree registered for the individual.

The potential number of years an individual spent in working life is calculated as age minus completed years of schooling minus age of school start, that is 6 in Turkey. For men, an extra year has been subtracted for the military service is obligatory for Turkish men. Average hourly wages are estimated from the gross annual earnings divided by the number hours worked in a year, that is average weekly hours of work multiplied by 4 and total number of months employed per year.

Econometric Model Specification

Two different approaches to measuring the impact of education on earnings have been used in this research. First, the standard Mincerian earnings function has been used for empirical testing of the returns to years of schooling. Second, a multiple treatment model OLS regressed in order to evaluate the returns to different educational degrees.

Standard Mincerian semi - logarithmic earnings equation specified as;

$$\ln W_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^2 + \varepsilon_i \qquad (1)$$

where; ln W_i refers to the log of gross hourly wages, S is the years of schooling, EXP if the potential years of experience, and the ε_i is the error term. Mincerian equation assumes a linear relationship with the earnings and the years of schooling and potential experience. This hypothesis is obtained from the human capital theory based on the assumption that the individuals accumulate human capital both at school, and in the labour market. Thus, earnings are assumed to depend on the level of schooling and on the job training proxied by potential experience. The model however, is subject to some sources of bias. First, this one factor model assumes that there are no differential trends for different educational levels. Rates of return are considered to be linear assuming each additional unit of education, that is years of schooling, has the same returns. Second, years of schooling and potential work experience explain about one third of the observed variation in individual earnings. Inclusion of a set of instrumental variables such as family characteristics (parental education, occupation, etc.) and other location / region related variables, or the use of siblings / twins data are proposed and used to account for the endogeneity of schooling (Altonji & Dunn, 1996). Due to the lack of data on family characteristics and twins or siblings, this sort of bias cannot be eliminated from this research.

In order to account for the returns to different educational degrees, a multiple treatment specification, distinguishing the impact of many different educational levels, is also used for empirical estimation.

$$\ln W_i = \alpha + \beta_1 S_{1i} + \beta_2 S_{2i} + \beta_3 S_{3i} + \beta_4 S_{4i} + \beta_5 S_{5i} + \varepsilon_i \qquad (2)$$

Where; $S_1 = 1$ if the individual completed elementary school, $S_2 = 1$ if the individual completed junior school, $S_3 = 1$ if the individual completed vocational school, $S_4 = 1$ if the individual completed a higher education, and $S_5 = 1$ if the individual has a postgraduate degree.

Empirical Findings on Returns to Education in Turkey

Coefficients documented in table 1 obtained by estimating a standard Mincerian equation, that regresses the log of individual earnings on years of schooling, potential experience and its square. In line with the conventional wisdom, hourly wages increase with education. Comparing the estimation results for 1994, and 2004 demonstrates an increasing trend in returns to education for

both men and women. However, each additional year of schooling reveals much higher returns for women than men, which may be due to the fact that the women have less opportunities to get educated, and in turn much higher marginal returns in Turkey. The effect of potential experience is also positive, and an additional year of experience seems to account for around 4 percent of the increase in earnings for both genders in 1994. There is also a considerable increase in the impact of accumulated experience on earnings over the years.

Table 1: **Standart OLS Specification: gross log hourly wages regressed on years of schooling, potential experience, and square of potential experience**

	1994		2004	
	MEN	WOMEN	MEN	WOMEN
Year of Schooling	.09 (.00200)	.08 (.00494)	.10 (.00312)	.14 (.00684)
Potential Experience	.04 (.00310)	.04 (.00569)	.08 (.00383)	.05 (.00712)
Potential Experience Squared	-.0003 (.00005)	-.0005 (.00017)	-.0011 (.00006)	-.0005 (.00016)
Number of Observations	9788	3560	5627	1220
R – square	.20	.23	.32	.29

Replacing the years of schooling variable with dummies for different educational degrees, table 2 reveals the following results.

Table 2: Returns to educational degrees

	1994		2004	
	Women	Men	Women	Men
Elementary (8 years)	.04 (.01355)	.05 (.02779)	.06 (.01006)	.06 (.04287)
Junior (3 years)	.16 (.01983)	.16 (.03284)	.23 (.01115)	.14 (.04669)
Vocational (3 years)	.05 (.02706)	.17 (.04717)	.21 (.01257)	.15 (.04932)
Higher Education (2-4 years)	.10 (.01851)	.10 (.03543)	.19 (.01114)	.16 (.04857)
PostGrad. (2-4years)	.11 (.02123)	.16 (.05343)	.25 (.02357)	.21 (.01227)
EXP	.0425 (.01533)	.0373 (.00323)	.0519 (.00696)	.0744 (.00292)
EXP SQUARED	-.0006 (.00028)	-.0003 (.00006)	-.0004 (.00017)	-.0010 (.00006)
N of Observations	2187	3788	2609	3627
R2	.27	.20	.35	.30

It is interesting to note that, the returns to education have fallen for the lower educational levels and have risen for the higher and post graduate education for both men and women. Marginal returns to elementary school diploma seems to decrease over the years, which may be due to the fact that both sectors increased the demand for higher qualifications.

Comparing returns to men and women, though in 1994 male workers have had higher returns for their educational attainments, over years the gap seems to get closed. In order to detail this analysis, a sectoral look at the dynamics of returns to educational degrees may highlight some

facts. Table 3 demonstrates that, in 1994 the services sector revealed higher rewards for the junior and higher education for women compared to the industry sector. Though, there seems that there is not much significant increase in rewarding male workers for their educational degrees completed over the years. It appears that there is a striking increase in the returns to higher education in the industry sector over 10 years for both genders. Though there is not much change in returns to vocational training over the years for men, it seems to bring much more reward for women particuarly for in the services sector. There is particularly a considerable increase in rewarding of the vocational education for women across ten years, which may possibly be the outcome of an increase in demand for technically skilled labour in especially female dominated industries over the years. Men appear to get higher rewards for their accumulated experience relative to their female collegues.

Table 3: Sectoral Analysis of the Returns to Educational Degrees

	INDUSTRY - 1994		SERVICES - 1994		INDUSTRY - 2004		SERVICES - 2004	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Elementary	.05 (.05196)	.05 (.07413)	.05 (.03073)	.04 (.07183)	.05 (.09793)	.02 (.08538)	.06 (.03549)	.03 (.07161)
Junior	.15 (.06240)	.12 (.09211)	.15 (.03649)	.18 (.87576)	.15 (.09276)	.13 (.01228)	.16 (.03761)	.14 (.06134)
Higher Education	.16 (.07366)	.09 (.09343)	.15 (.03878)	.14 (.08328)	.20 (.08695)	.20 (.06082)	.16 (.03898)	.21 (.06362)
Post Graduate	.01 (.07961)	.06 (.08244)	.17 (.07105)	.04 (.07865)	.25 (.08973)	.25 (.05714)	.18 (.07722)	.17 (.05764)
Vocational	.18 (.06844)	.10 (.08984)	.16 (.05479)	.09 (.09763)	.16 (.09943)	.15 (.06133)	.17 (.04240)	.21 (.06584)
EXP	.03 (.00591)	.03 (.01333)	.03 (.03637)	.03 (.01153)	.07 (.00527)	.05 (.01429)	.06 (.00219)	. 05 (.00654)
EXP-squared	-.0004 (.00010)	-.0003 (.00021)	-.0003 (.00006)	-.0003 (.00018)	-.0009 (.00011)	-.0002 (.00032)	-.0008 (.00004)	-.0010 (.00018)
Number of observations	3151	1251	7717	1335	3907	995	10510	1497
R-square	.17	.18	.18	.28	.36	.19	.30	.30

Concluding Remarks

The average returns to additional year of schooling has revealed even lower marginal returns for the lower educational degrees for both genders, but significantly increasing trends for higher educational levels for both men and women. Increase in the rewarding of the industrial sector appears striking. Marginal returns to a year of schooling for the higher and postgraduate education imply considerable rise over the years for both genders. Though there is not much change in returns to vocational training for men, it seems to bring much more reward for women over the years, particuarly for the services sector. This increase in returns to higher levels of education and vocational schooling may be attributed to the industrialisation and the corresponding increase in human capital needs of the country over ten years. The results also display a marked improvement in the rewarding of accumulated experience. The rewarding of work experience has been increased notably across years especially for male workers. In constrast, accumulated work experience has been only moderately reflected in the wages of women.

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Human Resources

Efficiency in Turkish State Libraries
a Data Envelopment Analysis Application

Sacit Hadi Akdede
Adnan Menderes University

Yigit Kazancoglu
Izmir University of Economics

This paper investigates the relative efficiency of public (state) libraries of major cities in Turkey by applying a data envelopment analysis. Scale, technical, and overall efficiency scores are calculated. It is found that there is a negative correlation between economic and social development index of the cities and efficiency scores of state libraries of same cities. In order to understand the sources of technical inefficiencies, the slack analysis is employed. Book collection and library staff are turned out to be the most problematic inputs and library members and lending of the books the most problematic outputs.

Introduction

Efficiency problems in public sector have been at the center of economic and political debates in Turkey for a long time. It has been argued that many public/government institutions are using government funds and resources ineffectively. However, empirical studies addressing the issue are very rare. Therefore, the motivation of this paper is to investigate empirically a hotly debated subject and initiate research about efficiency evaluation of public sector institutions using the example of public libraries. It is hoped that our results help policy makers in their decisions in allocating public resources to different services and administrative units and in making the services better.

Studies of efficiency in different fields of the public sector have been reported in the literature (Fox, 2002; Ganley and Cubbin, 1992). This study, however, is one very few analyzing the efficiency in public sector service production in Turkey. It may well be the first one to assess the relative efficiency of public libraries in Turkey by examining the relationship between library inputs and library outputs.

The recent article of Moore (2004) is a good descriptive summary about the importance of libraries and new trends about them. In it, widespread network of public libraries and their functions and services are descriptively analyzed. Another recent study about the importance of public libraries or willingness to pay (WTP) is that of Aabø (2005), which uses the contingent valuation method to analyze demand for library services.

Efficiency analysis of libraries has been reported before in the literature as well (Chen, 1997; Vitaliano, 1998; Hammond, 1999 and 2002; Worthington, 1999), to name just a few. Almost all of the studies except Hammond (1999) use data envelopment analysis (DEA). The DEA method, which is not explained in detail here, was first developed by Charnes et al. (1978) who employed a mathematical linear programming (CCR) model to create efficiency frontier. Then Banker et al. (1984) derived a revised model (BCC model) to measure technical and scale efficiency. The basic idea of DEA is to identify the most efficient decision making unit(s) (DMUs) among all the DMUs. All the papers mentioned above investigate the efficiency of libraries in developed countries. The contribution of the present paper is the fact that it analyzes a diverse cross section of public libraries in developmentally different regions of Turkey, which is an emerging country. It is usually assumed that less developed regions of a country use the public resources less effectively. This assumption or hypothesis will be tested in this paper in the context of public libraries of different cities.

Therefore, this study investigates relative efficiency of public libraries of different provinces in Turkey by using DEA. It derives overall, technical, and scale efficiency scores for a sample of 81 provincial state libraries. The required input values implied by the analysis also enable one to identify which of the inputs are most strongly associated with inefficiency. Section 2 describes the public library services in Turkey. The next section analyzes library inputs and outputs used in this study along with the data resources and DEA efficiency scores of individual libraries. Section 4 gives the empirical results and the last section provides a brief conclusion.

Public Library Services in Turkey

Public libraries in Turkey are owned and governed by the state and there is a high degree of centralization in managing libraries, as with many other public services in Turkey; the correct term is state libraries instead of public libraries. Even though some local governments (municipalities) own and operate libraries independently of the state, these are only a small percent of the population of libraries in Turkey, and their size in terms of number of books, is very small. University libraries are not used by the general public; and therefore, they are excluded from this paper. Only state owned libraries of main provinces are investigated. All state libraries are governed by the state; all employees are appointed by the central government which also determines policy as to how to manage or direct the library. Therefore, there is little autonomy in terms of employing and firing staff, moving a location or buying new books and materials for the library.

The only services a typical Turkish public library provides to the public are space for reading periodicals at certain times of the day, and lending books to members. Becoming a member

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of a library requires some minor paperwork. One has to bring an official paper which shows where the prospective member lives in terms of the neighborhood, two pictures for library ID card, and a small fee for membership. This paperwork can probably explain the difference between number of library members and number of library users; the later is a lot larger than the former for every library in the sample. Especially evidence of residence is big deterrent for membership since one might not get official paper easily because local authority to issue that paper might not be available at the time one needs it. In short, this requirement can delay or totally terminate the membership desire of people. In a personal interview with the manager of a provincial library in Turkey, we learn that this requirement can be waived by the manager of the library if the person has certain qualifications like having a regular job, or having a government job or being a teacher, professor, officer or soldier. In smaller provinces, people usually know about each other and the first requirement can be waived most of the time if wanted.

Data Envelopment Analysis and Library Inputs and Outputs

In this section, a DEA is proposed to evaluate relative efficiency of state libraries in Turkey. The sample constitutes 81 main state libraries as the decision making units (DMUs) of 81 different major cities (provinces) in Turkey. Metropolitan and developed cities like Istanbul, Ankara, and Izmir have more than one library; libraries of universities, libraries of some civil society organizations like libraries of chambers of commerce, libraries of different public institutions like those of municipal authorities, etc. In fact, there are 16 metropolitan municipal authorities (MMA) in Turkey and they are administratively, economically and socially more developed than rest of the cities. These 16 cities have more than one library even though state has only one branch. Other libraries in these 16 cities belong to other institutions mentioned above. Other cities usually have only one library, which is owned by the state and only one branch in a given city.

Library inputs and outputs are to be identified to apply DEA. Measuring Academic Library Performance (MALP), a comprehensive manual of performance evaluation, is recommended by the American Library Association (ALA). The MALP manual provides many output measures for university library performance evaluation. The evaluation in this paper as in Chen (1997) is based on the MALP manual published by ALA and availability of data. Based on the manual, the output measures are conducted using the following items: attendance or reader visits (library users), book circulation (number of borrowed or checked out books). Number of library members and the ratio of library members to reader visits (library users) are also used as output measures. All the output items except for the ratio of library members to library users are normalized by the population of the city.

The input measures are based on the items listed in the Standard of University Libraries provided by the American University Library Association. Even though this current paper is not about university libraries, we follow the Standards for University Libraries as in the case of Chen (1997). Our evaluation selects the following inputs: library staff, book collection (number of books), and area of library space. Economic and social development index (ESDI) of the cities, which is calculated by State Planning Organization (SPO), is also used as one of the inputs since this index can be used as a proxy for the environment in which a particular library operate.   This environment can be quality of employees, or can be a proxy for rental values of library building since in developed cities property is more expensive, etc. The basic framework to employ DEA is as follows.

INPUTS		OUTPUTS
BOOK COLLECTION (I1) →		→ LIBRARY MEMBERS / POPULATION (O1)
LIBRARY SPACE (M^2)(I2) →	DMUs 81	→ LIBRARY MEMBERS / LIBRARY USERS (O2)
LIBRARY STAFF(I3) →		→ LIBRARY USERS / POPULATION (O3)
DEV.INDEX (I4) →		→ BOOK LENDING / POPULATION (O4)
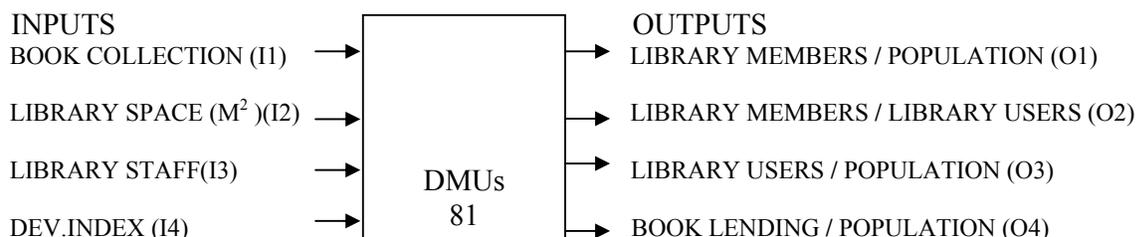
The time span of the analysis is the average values of 2003 and 2004. Unfortunately data for previous years for big city libraries are not organized by the Ministry of Culture. All data, except ESDI and population values, are taken from the Ministry of Culture in Turkey. Population values are taken from the State Institute of Statistics (SIS) in Ankara.

Descriptive statistics about library variables is given in Table 1.

Table 1 Descriptive Statistics

	Book Collection	Library Users	Library Members	Book circulation	Library Staff	Library Space	Dev. Index	Pop.
max	1076135	721410	14162	164278	41	5500	4.81	8831805
min	21940	10868	171	2339	4	100	-3.49	17274
mean	160306.06	257677.16	5279.185	53588.48	11.25	942.494	0.001	369334.1
Std. dev	156674.78	175233.66	3533.121	40380.44	7.03	830.789	1.08	1058051

Now the idea of calculating DEA scores can be formulated as a linear programming problem. Y_{rk} denotes as the rth output of the kth decision making units (DMUs) and X_{ik} as the ith input of the kth DMU. If a DMU employs m inputs and s outputs, the overall efficiency score of the kth DMU, ϕ_K, is a solution to the linear programming problem (CCR model).

CCR MODEL

$$\text{MAX} \quad \phi_K = \sum_{r=1}^{s} \mu_{rk} Y_{rk}$$

S.T.

$$\sum_{i=1}^{m} v_{ik} X_{ik} = 1$$

$$\sum_{r=1}^{s} \mu_{rk} Y_{rk} - \sum_{i=1}^{m} v_{ik} X_{ik} \leq 0 \qquad i=1,\dots,m \quad r=1,\dots,s \quad j=1,\dots,N$$

$$\mu_{rk} \geq 0 \ , \ v_{ik} \geq 0$$

where μ_r and v_i give the weights associated with each output and input, respectively. The objective function of the above problem seeks to maximize the efficiency score of a DMU, ϕ_K, by choosing a set of weights for all inputs and outputs. A DMU is considered to be efficient if the objective function of the associated problem results in an efficiency score of 1, otherwise it is considered to be inefficient. CCR model calculates the overall efficiency scores.

Overall efficiency (OE) can be decomposed into (pure) technical efficiency (TE) and scale efficiency (SE) since OE is equal to the product of TE and SE. The BCC model, mentioned in the introduction, is used to decompose OE into TE and SE. The BCC model is the revised version of CCR model. The former model can be reformulated by adding $\sum_{j=1}^{N} \lambda_{jk} = 1$ to the dual problem of the CCR model, which serves very important purpose to decompose OE. The BCC model is as follows

BCC MODEL

$$\text{MIN} \quad \theta_k$$

S.T.

$$\sum_{j=1}^{N} Y_{rj} \lambda_{jk} \geq Y_{rk}$$

$$\theta_k X_{ik} - \sum_{j=1}^{N} X_{rj} \lambda_{jk} \geq 0 \quad i=1,\dots,m \quad r=1,\dots,s \quad j=1,\dots,N$$

$$\sum_{j=1}^{N} \lambda_{jk} = 1$$

$$\lambda_{jk} \geq 0$$

Empirical Results

CCR model produces the overall efficiency scores of DMUs and BCC technical efficiency scores. Scale efficiency of a DMU is calculated as the ratio of CCR efficiency to BCC efficiency. All the libraries in the sample except for those of Bolu and Afyon have exactly the same BCC efficiency scores as CCRs. Therefore, overall efficiency scores, except for those two cities, are also technical efficiency scores, which are generalized in Table 2

Table 2 Overall Efficiency Frequency

OVERALL EFFICIENCY RANGE	FREQUENCY
≤ 0.4999	36
0.5000-0.5999	10
0.6000-0.6999	7
0.7000-0.7999	6
0.8000-0.8999	1
0.9000-0.9999	4
1	17
TOTAL	81

Afyon has overall efficiency and technical efficiencies as 0.38 and 0.28 respectively Bolu's values are 0.12 and 0.40. Therefore, these two cities are scale inefficient as well. Since BCC model allows for variable returns to scale, the source of scale inefficiency can be identified by calculating the BCC model above one more time with replacing $\sum_{j=1}^{N} \lambda_{jk} = 1$ by the $\sum_{j=1}^{N} \lambda_{jk} \leq 1$ constraint for these two cities. It is found that new efficiency values are exactly the same as technical efficiency values for both cities; this is the evidence that both cities have decreasing returns to scale (DRS). That is, reducing the scale or capacity of libraries in these two cites would increase the scale efficiency. All other city libraries are scale efficient since their scale efficiency scores are 1. This result is not surprising since state libraries in every city in the sample were established in 1960s. Over the last 45 years one would expect that libraries would find their optimal size and scale. Therefore, the source of overall inefficiency is the technical inefficiency for almost every library.

17 out of 81 city libraries are efficient as shown in Table 2. Efficiency scores are regressed on a dummy variable, west, taking the value of 1 for the Western cities, and 0 for the Eastern cities. This division of all cities is used by public administration discipline in Turkey. A strait line from Samsun in the North to Adana in the South divides Turkey into two main regions. Cities on the left side of the line are the Western cities, and cities on the right are Eastern ones. It is found that efficiency scores of libraries are not statistically significantly different between the East and the West regions of Turkey. This finding is actually contrary to common belief in Turkey since it was expected that less developed regions have less efficiency of resource use in any activity. Economic and Social Development Index (ESDI) is also regressed on the same dummy variable, west, and it is found that Western cities on average have higher development index than Eastern cities. This is confirming the common belief that Western cities on average are more developed. The relationship between efficiency scores and Economic and Social Development Index is also examined by Pearson correlation test for all cities. It is found that there is a significant negative relationship between efficiency scores of city libraries and ESDIs of cities (r=-0.28 , p=0.01). A stronger relationship is found in only Eastern cities (r=-0.39, p=0.01), while no relationship in the Western cities. These findings imply that less developed cities have more efficient libraries, especially in the Eastern cities.

In the less developed cities, there are no alternatives to get information and knowledge, most schools don't have big libraries and many less developed cities don't have major universities, especially in the Eastern region. Some developed cities of the Eastern region have major universities and public libraries of those cities have relatively lower efficiency scores since universities have much bigger libraries and university students don't use public libraries. In these cities there are more movie theaters and in some of them there are established state theaters. Therefore for socialization public libraries are not necessarily best places for students. In these more developed cities of Eastern region, public libraries have lower efficiency. Most libraries in the less developed cities are places not only for school work and school related information, but also for socialization of students and readers since library is an acceptable place to let their school children, both girls and boys alike, go out for many families in these very traditional cities in Turkey. Also, there are no major theater groups and state theaters, not many movie theaters in the less developed cities of the Eastern region. Therefore, city library is one of the attraction places of the city in those cities and therefore relatively has higher efficiency scores. Another observation is that all 16 metropolitan cities except Istanbul have lower efficiency values than average efficiency of inefficient libraries. Only three out of 16 metropolitan cities are in the Eastern region. In these metropolitan cities, there are many alternatives for both socialization and acquiring information about school work or only reading.

There is one city that breaks the pattern or paradigm laid out here, Istanbul. Istanbul is not a typical big or metropolitan city. It is a cosmopolitan city. It has the highest social and economic development index. There are many major public and private universities in Istanbul and many socialization places, movies, theaters, museums, many other institutions' libraries. It would not be surprising if its efficiency score would have been lower than the average of inefficient libraries. However, it has an efficiency score of 0.98. This is not 1, but it is not a lower efficiency score. A considerable portion of population in Istanbul is not registered to any school or university, looking for jobs constantly, preparing for the university entrance exam, and not economically well off. These people mostly use public library of Istanbul and the library has a higher efficiency score.

Now, the sources of technical inefficiency are investigated by the slack analysis in Table 3.

Table 3 Slack Analysis

Efficiency Range	Ave. Eff.[2]		I1	I2	I3	I4	O1	O2	O3	O4
≤ 0.4999	0.334	REQ	3.35	9.23	4.27	15.96	22.17	24.81	16.49	20.21
		ACT	18.99	36.52	22.50	44.96	10.84	25.49	17.86	13.36
0.5000-0.5999	0.556	REQ	4.54	11.89	5.94	26.82	33.82	38.53	26.09	35.37
		ACT	9.45	21.71	16.33	40.42	21.41	37.00	24.06	24.11
0.6000-0.6999	0.651	REQ	5.74	12.16	6.15	28.17	36.80	38.26	29.34	38.35
		ACT	12.02	19.16	19.15	41.15	27.00	37.88	29.02	29.89
0.7000-0.7999	0.759	REQ	4.39	9.84	3.89	23.90	23.33	23.34	24.64	29.50
		ACT	9.98	15.86	6.25	37.29	15.62	20.48	29.25	24.74
0.8000-0.8999	0.813	REQ	2.19	11.89	4.32	36.81	21.82	62.34	10.73	18.05
		ACT	8.36	14.63	21.82	40.84	17.79	62.34	10.73	12.21
0.9000-0.9999	0.984	REQ	2.28	10.22	4.11	24.57	18.94	37.16	14.23	17.67
		ACT	27.14	26.83	13.78	47.20	11.59	31.90	15.29	13.79

REQ. and ACT mean required and actual values, respectively. These values are all in percentage terms.

[2] Average Efficiency

As is shown in Table 3, in all ranges of inefficiencies, all inputs are used more than required since actual values are larger than required ones. If the ratio of actual to required inputs is 1 or close to 1 from below for a particular input, then it means that that particular input is used efficiently. These actual and required values are coming from the slack analysis. In none of the efficiency ranges, for no inputs, that ratio is 1, that is, all of them are greater than 1. This means that all the inputs are used inefficiently in all inefficient libraries. However, some inputs are used more inefficiently than others, meaning priorities should be placed on more urgent inefficiencies. First priority should be placed on the input with highest actual/required ratio; the second priority should be placed on the second higher ratio, and so on. The same priority analysis is used for outputs as well. If the ratio of actual to required outputs is 1 or close to 1 from above, then output production is efficient. In our case here, most ratios are less than 1; it means that productions of those outputs with less than 1 actual to required ratio should be improved. That is, first priority should be given to output type with smallest less than 1 ratio; the second priority should be placed on output type with second smaller less than 1 ratio, and so on. If the ratio is higher than or equal to 1, then there is no problem with that output type, no priorities need to be placed on that output type. Table 4 gives the priorities that need to be placed on both different input and output types.

Table 4   Priorities to eliminate inefficiencies

Range	Input Priorities				Output Priorities			
	1st Priority	2nd Priority	3rd Priority	4th Priority	1st Priority	2nd Priority	3rd Priority	4th Priority
≤0.4999	I1	I3	I2	I4	O1	O4	----	---
0.50-0.59	I3	I1	I2	I4	O1	O4	O3	O2
0.60-0.69	I3	I1	I2	I4	O1	O4	O2	O3
0.70-0.79	I1	I2	I3	I4	O1	O4	O2	---
0.80-0.89	I3	I1	I2	I4	O4	O1	O2	O3
0.90-0.99	I1	I3	I2	I4	O1	O4	O2	----

Table 4 shows the priorities to be considered to reduce and increase the actual to required for inputs and outputs, respectively. In terms of inputs, there is a pattern that for all inefficiency ranges, input type 1 and input type 3, book collection and library staff, respectively, have highest inefficient use of resources. In terms of output, there is pattern that for all inefficient ranges, output type 1 and output type 4, library members to population and book lending to population, respectively, have highest inefficient production of those outputs.

As policy implications, in order to reach the efficient level, library members to population and book lending to population should be increased. Such slack values must be interpreted carefully because the analysis takes the output to be exogenously determined; input oriented CCR model is used to calculate the overall efficiency scores. Given the centralized and bureaucratic structure of Turkish library system, the logical implication is that the elimination of output slacks can not be regarded as the obligation of local library managers. Nevertheless, differences in relative magnitude of output slacks maybe indicative of the weights attached to the member of the output vector, in planning library provision for the service area. Therefore, if the library provision is to be planned by the state, then some policies should be proposed to increase the membership and book lending. The way to increase the library members is to eliminate the bureaucratic structure of membership process and update the book collection frequently. This in turn increases book lending to population which is the fourth output in our model.

In terms of inputs, book collection should be updated or renewed. According to our slack analysis, book collection is more han required for given efficiency scores. Existing book collection

is not up to date and has limited variety. The most important thing here is not quantity of the book collection, but quality and variety of the books. This in turn increases the number of library members and book lending, which were problematic output types. According to our data and analysis, library users are much higher than library members and book lending is not at the required levels. This implies that people who come to library do not become members of the library and neither do they check out the books. This can be in line with bureaucratic cumbersome procedure of membership and the non diverse and not updated nature of book collection. It is the common fact that book collection is not updated in city libraries very frequently and also there is no data about the circulation of periodicals. Another problematic input type is the number of library staff; actual number of library staff is a lot larger than required number. Labor market for government employment in Turkey is also highly centralized. Staff in any library is appointed by the central government in Ankara. Employment policies don't always follow the line of economic and operational reasoning. That is, in many times very populist employment policies have been employed in many public services in Turkey. Therefore, it is quite often the case that a library staff is appointed into a library in which there is no need for a new staff. In addition, only very small percentage of library staff is librarians, which in turn affects the quality of the service and in turn affects the number of library users, library members, and lending of the books, which were our critical problematic outputs. In order to improve the efficiency, highly centralized structure of employment and other policies of public libraries (budgeting, updating books, making library more relevant to local people's most urgent needs, promotion activities, etc) should be relaxed, and more power should be granted to local public authorities since local public authorities are the best to know about the local peoples needs, wants, and service demands.

Conclusion

This paper investigates the relative efficiency of public (state) libraries of major cities in Turkey by applying a data envelopment analysis. All the libraries except for Bolu and Afyon have been found scale efficient. Technical efficiency scores are calculated. It is found that there is a negative correlation between economic and social development index of the cities and efficiency scores of state libraries of same cities. This negative relationship is significant and very prevalent especially in the Eastern region, where development index is smaller than that for Western cities. It is explained in the text that in more developed cities there are alternatives to reach information and to socialize. In order to understand the sources of technical inefficiencies, the slack analysis is employed. Book collection and library staff are turned out to be the most problematic inputs and library members and lending of the books the most problematic outputs. Library users as output type are not a problematic output. This implies that people use libraries, but for some reasons are having problems of becoming members. This might be because of cumbersome membership process. Book collection is very old, not up to date as it is the well known fact of libraries in Turkey. Even if there is more than enough number of books in the libraries, variety and updated books are not enough. This is also proved by smaller number of book check outs and low percentage of library membership. In terms of employment in the libraries, too many non-librarians have been employed in the libraries. This might be because of highly centralized structure of the public labor market and state library management.

As policy implications, this paper suggests that book collection should be updated and diversified. Membership procedure and level of bureaucracy related to the membership process should be shortened and simplified. High centralized structure of state libraries should be relaxed, and local authorities should take more responsibility to design the public services in terms of public libraries.

Finally, it is suggested that government institutions should employ this kind of efficiency analyses into many different areas of public service productions.

Appendix I: Population of City libraries in the analysis according to efficiency range.

≤ 0.4999 : Kirsehir, Balikesir, Aksaray, Batman, Adiyaman, Bingol, Erzincan, Manisa, Sanliurfa, Diyarbakir, Kocaeli, Kirikkale, Denizli, Sakarya, İsparta, Eskisehir, Trabzon, Hatay, Afyon, Tokat, Sivas, Erzurum, Mersin, Kars, Samsun, Malatya, Elazig, Antalya, Adana, Kayseri, Konya, Izmir, Ankara, Gaziantep, Bolu, Bursa.

0.5000-0.5999 : Usak, Siirt, Osmaniye, Agri, Canakkale, Kutahya, Corum, Tekirdag, Zonguldak, Van

0.6000-0.6999 : Rize, Ordu, Yozgat, Edirne, Amasya, Burdur, Duzce

0.7000-0.7999 : Aydin, Bayburt, Sirnak, Nigde, Gumushane, Kilis

0.8000-0.8999 : Karaman

0.9000-0.9999 : Hakkari, Igdir, Istanbul, Ardahan

1 : Artvin, Bartin, Bilecik, Bitlis, Cankiri, Giresun, Karabuk, Kastamonu, Kirklareli, K.Maras, Mardin, Mugla, Mus, Nevsehir, Sinop, Tunceli, Yalova

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NATURAL RESOURCES

Energy Security of Turkey

Havva Çaha
Fatih University

This study analyzes whether Turkey ensures energy security, compared to some criteria in regard to various energy resources, or not.

The paper will firstly explain the meaning of energy security and its main concepts such as energy diversity and storage. Given answer to the question how energy security is perceived in some countries like USA, EU, China, and Russia, the paper takes an interest in Turkey's energy security. To determine the amount of energy dependency of Turkey, the paper concentrates on the consumption and production of various energy resources like coal, oil and natural gas in the country. Then it emphasizes over the diversification of energy suppliers and emergency policies under some energy crisis.

 Energy has a vital importance in human life and is perhaps one of the most important factors in economic growth. Until 1970, energy was cheap and easily obtained compared today. After the oil crisis of 1973 this situation has been gradually changed and most of the countries started to face with energy problem. Energy security has been the main foreign policy issue for some countries. Particularly USA puts very active foreign policies into practice for energy security. Similarly EU creates some projects to secure energy for Europe. IEA puts minimum requirement such as 90 days oil stocks to prevent possible effects of oil crisis for members. Turkey seems to be a non self-sufficient country in respect to oil and natural gas according the recent data and has to import growing energy demand from other countries. Therefore, energy security should be the main problem in Turkey's energy policies. But there are some problems for securing energy in reality. Especially Turkey has diversification problems for natural gas unlike oil. Turkey has no storage facility for natural gas and also didn't perform to lay minimum 90 days oil stock down as a necessary condition of IEA up to now.

Finally we can say that Turkey will live serious energy security problems if it faces with any shortage in oil or natural gas.

Introduction

Energy is perhaps one of the most important factors in human life and in economic growth. Until 1970, energy was cheap and easily obtained, compared today. However after the restriction of oil production that was made by OPEC in 1973, world started to face with the oil crisis and the risen oil prices that caused negative influences on the world economies such as increasing inflation rates, reduction of production and some shortages of goods and services. As a result of this energy security has been main issue for almost all governmental policies over the world.

Energy Security Tools

Energy security can be defined as the availability of energy sources in sufficient quantities and the reasonable prices at the proper time. Disruption of energy supply may occur at any point in the energy supply chain and it can create energy crisis in a country, in a region or in the whole world. There are some factors that cause energy supply disruptions:

a. Political reasons: Since energy can be considered as a high political issue, conflicts between energy producing countries and energy consuming countries (or energy transit countries) can cause some supply disruptions.

b. Economic reasons: Sudden increase of energy price can lead to the supply disruption. For example, the last natural gas conflict between Ukraine and Russia was grounded on the disagreement between two countries on the price of natural gas.

c. Export restrictions or any embargo from producers. For example, the oil crisis in 1973 was caused by export restrictions that were made by OPEC.

d. War, terrorist attack or political instability of energy producing country: These factors may disrupt exploration, production, processing or transportation of energy. One of the vivid examples in that respect is terrorist attacks on pipeline infrastructures in Iraq.

e. Natural disasters, accidents or technical reasons: For example, hurricane Katherina, gave rise to fundamental damages to energy infrastructure and caused some disruptions of energy supply in USA.

Energy security policies can be divided into two main parts namely "short" and "long" term energy security policies. The short term energy security policies can be classified into two groups: "diversification" and "storage". These can be analyzed in the following way:

a. Diversification: The most important policy to ensure security of energy supply is the diversification of energy source, supply countries and supply routes. Since world economy seems to be entirely dependent on oil, other sources like coal and natural are considered as diversification tools for reducing oil dependency.

The US puts very active foreign policies into practice for diversification of energy supply countries because of the fact that energy security problem is considered as a national security issue. Iraq is the main oil suppliers to the US and this seems to be the most important reason of Iraqi War. Also European Union has been creating some diversification projects to secure energy for Europe and in order to satisfy this goal EU formed the INOGATE (Interstate Oil and Gas Transport to Europe) program. The Most important project of INOGATE is Trans-European Networks Project. This project promotes the regional integration of the pipeline systems and facilitates the transport of oil and gas from Caspian region to the European market. Russia is seen as a good example in that respect. As it is known Russia is the largest gas exporter country in the world and it tries to

diversify its natural gas export pipelines routes to reduce its energy export dependency on Ukraine (Socor, 2006).[1]

b. Storage: The second short term tool for securing the energy supply is the storage policy. After the first oil crisis, International Energy Agency (IEA) put some minimum storage policies to reduce influences of unexpected rising of oil price or disruption of oil supply. The minimum quantity required for the oil stock, in time scale, is 90 days. Today oil stocks of the members of IEA are approximately 4 billion barrels and 1.4 billion of these are under the direct control of member governments and the rest are in commercial stocks (IEA, 2005:1).

Although the IEA has not defined certain minimum requirements of gas storage as in the case of oil, those countries who use gas more have been establishing some storage facilities inside or outside their countries. Storage capacities of some countries for natural gas are as follows: Austria (32 %), France (26%), Germany (22%), Italy (22%) (World Bank, 2005: 2).

Turkish Energy Outlook

Although Turkey has a close geography to rich oil and natural gas reserves in the Middle East and Caspian region, Turkey's proven oil and gas reserves seem to be very low. Like many countries, Turkey has large coal and lignite resources. But Turkish coal and lignite have low calorific and high polluted values.

Primary energy production of Turkey is insufficient for the Turkey's energy requirements. The quantity of Turkish primary energy production was nearly 23,4 mtoe whereas consumption was approximately 79 mtoe and the amount of imported energy was nearly 55,6 mtoe in 2003. Turkey's oil consumption is 37,7% of total primary energy needs and nearly 92,5 % of it is imported. Also, natural gas provides 22,4 % of total primary energy demand and 97,4% of it is imported. Turkey needs to import gas from other countries in order to satisfy growing energy demands. This, eventually, brings Turkey to be entirely dependent on imported oil, and natural gas.

Turkey's growing energy requirements give rise to its dependency in respect to energy. As the time passes it seems that Turkey's dependency in that respect goes to increase more. For instance Turkey's energy dependency has been increased to 70,1 % in 2003 from 45,8 % in 1980. It is forecasted that Turkey's energy dependency   will reach to 76,5 % in 2020 (ETKB 1985 and ETKB 2002). The growing import dependency brings, indeed, serious problems for a country in respect to its cost and imported quantity. For example the cost of energy import increased from 13,4 billion dollars to 20.5 dollars in one year between 2004 and 2005. In other words we can say that the ratio of energy cost to the total import increased from 14, 2 % in 2004 to 17, 6 % in 2005. The main reason behind this is the rise of oil prices and changes in the Euro/USd rate.

The consequence of growing import dependency is heavy. For example the cost of energy import increased from 13,4 billion dollars or The increasing trend in energy dependency requires securing of energy supply for Turkey. Turkey actually imports coal from various countries and there seems, at current, no risk of over-dependency on coal. Crude oil has been coming from mainly Iran, Libya, Saudi Arabia and Russia and again Turkey is not seen to be under over-dependency on any single country (DPT, 2001: 89). But Turkey has a serious diversification problem in respect to the natural gas. Actually Russia seems to be the main supplier country for Turkey with 66 % of the Turkey's natural gas consumption in 2005. Turkey's dependency on Russian natural gas will continue to increase up to 69,2 % in 2020 (Çaha, 2003 : 200).

In order to improve the energy security and reduce the effects of energy crisis, Turkey should set up strategic reserves for oil and natural gas. But Turkey has no policies to reducing effects of supply distributions. For example, Turkey has no storage facility for natural gas nor it has any storage for oil. National Oil and Natural Gas Company of Turkey (TPAO) was actually

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[1] Ukraine is the main transit country for sending Russian gas to Europe's markets and currently 80% of Russian gas flows from Ukraine to Europe. Russia

planning to operate the Silivri Underground Gas Storage Facility by the mid-2006 but it seems that there will be a delay until the end of 2006. Moreover, Salt Lake Underground Storage Gas Facility is also in the agenda of the government and is planned to be completed by 2015.[2] The storage capacity will reach to 6 % of the total consumption after the Silivri project.[3] However, it should be noted that even this will not be sufficient when Turkey's long-term goals are considered.[4] Turkey should develop new energy policies to promote natural gas storage facilities.

Although there is no diversification of supply problem for oil Turkey has similar storage problem for oil. According to international agreements, Turkey should perform to lay away minimum 90 days oil stock but there seems, actually, no completed oil storage facility. There are some problems about establishing strategic oil stocks. First, although according to international agreements about minimum 90 days oil stock rules, The Petroleum Market Law requires only 20 days stockpiling. Also there are some complicated items about holding of stocks whether crude oil or petroleum products.

Conclusion

Turkey should put in practice some effective policies to improve energy efficiency. This seems to be too fundament and significant to reduce consumption of energy. To prevent rising trend in dependency on imported energy sources and to satisfy increasing energy demand, Turkey should restructure coal sector and encourage to using clean coal technologies that will help to improve indigenous coal reserves. Only, in such a way the production of energy and consumption of energy gap will be closed down. Otherwise one can say that Turkey will live serious energy security problems in case if it faces with any shortage in oil or natural gas.

[2] World Bank support the construction of The Salt Lake Underground Storage Gas System
[3] 6% of the total consumption will be nearly 2. 4 billion m.[3]
[4] Turkey's goal for storage capacity is ten percentage of annual consumption.

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Natural Resurces

Population, Poverty and the Problem of Natural Resource Management

Utpal Kumar De
North Eastern Hill University

The objective of the paper is to explore the interlinkage among the population growth, poverty and environmental resource use with special reference to North-East India.

Plethora of studies has been conducted and we find conflicting results from those studies. On the one hand, some of the studies concluded that there is an adverse impact of huge population growth on the management of natural resources and environmental conditions. On the other hand, some other studies concluded that population growth is not a problem rather it helps better management of natural resources and improvement of environmental quality.

The North-East India is one of the richest natural resource and biodiversity zone in the world and forest is the host of primary natural resources of the region. The region also recorded rapid population growth and higher incidence of poverty since independence, compared to other regions of the country. Hence the study is undertaken.

Data on population growth, incidence of poverty and changes in forest resources in terms of quantity as well as quality have been collected from the Census, Planning Commission and Ministry of Environment and Forests, Government of India.

After giving some critical review of some earlier studies, some flow charts are given to explain the population, poverty and environmental nexus and it is briefly explained. Also the explanation is given from the observation on the same all over the world. Then we explained the relation between population growth and changes in forest resources at all India level with the available data. Thereafter we have considered the changes in occupational pattern in North-East India and explained how the pressure on natural resources especially land and forest have been increased over time through tabular analysis. Finally, we calculated the correlation between changes in population and incidence of poverty and the changes in forest resources across the North-Eastern states. Also we compared the over time changes in population, poverty and changes in forest resources in the region. We have tested the results by statistical techniques. Then we analysed the results and tried to see whether any EKC type relationship exists or not.

The direct correlation between population growth and degradation of forest cover is not significant (0.05 only) across the North-Eastern states in India. But there is no doubt that population creates pressures indirectly on the resources as is reflected from the variation in per capita availability of resources, income, poverty and degradation. That is clear from the correlation between population growth during 1991-2001 and degradation in dense forest during 1989-99 in North East India, which is -0.51.

From the results we also observe that there is a significantly inverse correlation between the incidence of poverty and the degradation of forest. Also we observe similar kind of inverse relationship between the changes in poverty and the degradation of forest. The results indicate that the degradation of forest (either due to shifting cultivation or other reasons) increases with the decline in poverty in North East India.

Similarly we observe that the correlation between changes in forest cover and per capita income is positive but not so strong. It indicates that as per capita income rises, degradation of forest cover also rises. Even if we take the annual compound rate of degradation of forest during 1989 to 1999 a similar result is observed.

The results may appear to be inconsistent along with inverted U hypothesis (EKC). The fact is that all the North Eastern states have per capita income well below the national average. Moreover it is associated with high inequality, which is clear from the incidence of poverty. Hence many of the families still face the survival problem and hence they earn mostly from the forest. Poorer possibly uplifted them at the expense of easily accessible forest resource.

The positive correlation between per capita income and degradation of forest is due to fact that theses states are still in the rising phase of Environmental Kuznets Curve (EKC). Per capita income of all these states is well below the national average (over Rs 10000) per capita income. They are yet to reach the peak per capita income and the technology after which their dependence on forest will be declining and they will have the alternative opportunities. But the positive relationship between per capita income and degradation of forest is not significant, which may be because of the government policies and initiatives through joint forest management, community forestry, social forestry programmes etc that help protecting and regenerating many forest areas during last two decades. Andrew Foster has shown that economic development in India was associated with the rise in demand for natural resource (forest resource) that led to an increase in its supply during 1971 to 1999 (Smith, 2003). Among those states Mizoram and Tripura occupies top two positions in terms of educational achievement (e.g., higher literacy rate and enrolment ratio) and we observe improvement in forest resource or relatively less degradation there.

Though population growth is not found to be directly related to the degradation of resources in many cases, it indeed put pressure on the natural resources at least at the local and regional level. In addition to the pattern of livelihood, incidence of poverty and institutional arrangement, population growth can also add to the problem of degradation.

The effect is more if technology does not grow at the desired pace and sufficient alternatives of natural resources develop and unless people are able to produce continuously increasing amount from the identical resources. Thus it is not only the size of population but also the effective human resource development that matters much for resource utilisation and environmental degradation.

Moreover the market distortions, inequality in income, educational advancement etc. and regional disparities may play their important roles in inter-regional differences in degradation of resources.

Thus whatever Simon predicted from the examples of a few countries and over all world progress may not be applicable to the regions that are yet to achieve the level of development from which, environmental degradation and resource depletion starts improving. Moreover it would not be wise to allow degradation to continue till market establishes the balance (as there is uncertainty how long it would take to do so) and that may jeopardise our life. Hence Ehrlich rightly pointed out that while estimating the carrying capacity of a region one should take into account the resource condition of that region. One can add to it is the possibility of technological innovation that improves the productive capability of the available resources.

However it does not mean that there is no relevance of Julian Simon today. It is true that whenever human being confronted with some problems or crises (either due to population pressure or any other reason) they successfully overcome those through technological invention and their implementation. And that perhaps will continue to do so to solve the resource or other problem. At the same time, it is true that unless people were aware (for whatever reason) population would be much more than six billion, what is today and the problem would have been aggravated. It may also be the setback of many regions in terms of resource management and growth unless the benefits of technological development reach to all uniformly.

Introduction

What is the real problem behind the successful management of natural resources? Is it higher population growth or incidence of poverty or wrong institutional arrangement or something else? Even if the relation exists, does it differ from one region to another or from local level to global level? People have been struggling to know for long period of time and to formulate models linking one with another through their physical, technological, social and economic linkages that may lay down the basis for providing a meaningful solution to the observed problems and avoid any disturbance that ay lead to economic collapse.

After going through numerous literatures on the topic one may find it very difficult and confusing to conclude whether population really matters for environmental and resource management or not. Plethora of arguments and counter-arguments has been given since the development of literature on population and human resource, poverty, food security, environment and resource management as well as economic development and well-being.

From the studies available, we get the conflicting arguments on how population growth affects and is affected by the environmental changes. Historically human action has often been blamed for its adverse effect on environment and resource condition. Way back to Maulthus (1798) who was concerned about the growth of population to outrun the available food supply. The negative impact on the nature due to increasing pressure caused by the population growth and natural logic of diminishing marginal productivity of resources was inherent in his *An Essay on the Principles of Population*. The pessimistic views have been found in the writing of Ehrlich (1968), Meadows et al (1972) etc., who were of the opinion that the world would be falling short of critical natural resources after some time if population continues to grow. They argued that if the existing patterns of population growth and resource use continued, it would lead to environmental break down and economic collapse. Therefore a balance between the population growth and resource is well warranted for the sustainable growth of the economies.

On the other hand, we find in Julian Simon (1981, 1996), Simon and Myers (1994), who was of the opinion that population growth is not a danger, but a benefit. The world is not running at the risk of shortage of resources. Population growth in many cases helps economic development and better management of resources through their effort and improving knowledge, innovation. Thus human being continuously learns how to overcome the bottlenecks imposed by the nature. Gale Johnson (2000) also tried to prove through evidences that in spite of huge population growth in the last century the level of well-being has increased manifold. Also there is the weak sustainability argument of Hartwick (1977).

Their arguments derive supports from the fact that at the beginning of Christian era i.e., 1 A.D. world population was around 2.5 crore and growing at around 0.04 per cent per year. Now the world's population passed 6 billion and growing at an annual rate of around 1.5 per cent (Titenberg, 2003). Still now, Malthusian catastrophe that was expected to happen much before and the world to return to a subsistence level have yet not been materialized. The progress was supposed to halt because of over dependence on agriculture (that was subject to diminishing returns) and economic growth was supposed to be outstripped by the growth in population. In 1761 Robert Wallace also argued that the progress would eventually undo itself by overstocking the world with people (http://www.sthopd.net). The interesting point to note is that at the time Malthus wrote, most societies were constrained by the agricultural limits and the world population was what India's population today. Still now we did not observe any such catastrophe, rather we are living on an average in a better world today with better food security, fewer famines, lower mortality rates, enhanced life expectancy, better amenities and access to resources and most of those have been possible due to the advancement of education and technology in different fields. Whatever famines

and food insecurity we observe today are mostly localized and occur largely due to war, political unrest, market distortions, loss of entitlement and sometimes due to crop failure (that sometimes may be because of unplanned or unsustainable use of land resources).

At the same time we observe rising pollution level at many parts of the world, global worming, acid rain, ozone layer depletion, declining forest resources, rising mortality due to lack of access to safe drinking water, falling long term land productivity, loss of biodiversity etc. Those may be not only due to the growth of population but also for the application of advanced technology (but not environment friendly) to meet the increasing need of the growing population.

"The rapid growth of knowledge has resulted both from the growth of world's population and the increase in the percentage of that population that is now able to devote time and energy to the creation of knowledge" (Johnson, 2000, p. 13).

At a global level it may be partly true but not at the regional level. If that be so, more scientific inventions would have occurred in Asia and more so in China and India (where more than one third of world's population live and have experienced higher population growth for many years) and not in Western Europe. It may however be related to the percentage of people engaged in academic and innovative activities, which is definitely higher in European countries. If the acquired knowledge is not distributed uniformly the gain as happened may not lead to harmonious development that has always happened due to political and social disturbances as well as individual/selfish oriented motives.

Here it is to be noted that rising population, when total population is well below the carrying capacity may raise the labour supply, contribute more to the production, better management of resources and thus well being. In other words, if we accept the notion of carrying capacity and the level of population is well below that capacity, growth in population normally tends to better utilization of resources from their sub-optimal level with given technology and other parameters. If it crosses that limit, it would lead to rise in pressure on and thus depletion of resources. Definitely, technological development enhances the scope for use of any resource, its productivity and the capability to tolerate and bear more people (i.e., enhance carrying capacity) over time but there is uncertainty whether the same can grow at the required pace all the time and uniformly. It also varies with the variation in consumption basket that changes along with the changes in standard of living and adjusted by the people with technological invention and innovation. However the concept of carrying capacity is of very little relevance to those who have been optimistic (Simon, Johnson, Solow, Hartwick etc.) and think each and every constraint would be overcome if everybody is free and the markets are allowed to play their role, ensuring that is a remote possibility.

Some people often cite the examples of some countries like, Nertherlands, Taiwan, Hongkong etc. where the population density have been very high yet developing at faster rates compared to many other countries with lower density of population and thus population may not be a constraint. Also we observe the North-Eastern part of India that suffers from declining forest resources with comparatively higher population growth and sustained poverty (though population density is still well below the national average and poverty level declined over time). That may also be due to lack of alternative opportunity and growing population depends more on natural resources and their traditional agricultural practices.

This paper thus tries to *explore the interlinkage among the population growth, poverty and environmental resource degradation with special reference to North-East India*.

Population, Human Resource and Environment

Whether we accept or reject the argument of adverse impact of population expansion on environmental and resource condition, there is a general belief that more population means more demand for food, shelter, clothing, amenities etc. and hence more drain on natural resources at any existing level or pattern of livelihood (that is also determined by the consumption behaviour of the people) and given technology. A change in pattern of livelihood and technology on the other hand

with given density of population may change the consumption and demand for natural resources and thus modify the environmental parameters.

However size of population is not all that matters rather the pattern of consumption that is again determined by the entitlement. A country with even less population can consume and degrade more resource than a country with higher population. For example, an average American consumes more fossil fuel (as per capita number of car is many more than in India) than an average Indian. Hence total resource used and pollution generated in a country with less population may be more than a highly populated country. Similarly, rising consumption and industrial progress in one region besides degrading its own resource may lead to the depletion of natural resources in other region. Also, the pollution generated in one country may affect the other countries or all over the world. E.g., during colonial rule, the rulers abruptly used the natural and other resources of their colonies for meeting their industrial progress. The green house gasses and chlorofluorocarbon emitted from the industries of one country affect people all over the world. Thus the conclusion derived from the explanation of local or regional level population-environment interrelation may not be applicable to global changes in environmental attributes and vice versa. Moreover there are inter and intra-regional relationships. The inter and intra-regional changes are contingent upon the factors like consumption pattern, trade linkages, level of income and incidence of poverty, educational achievement, technological changes etc and their interactions. In fact, the human activities changes according to their socio-economic conditions (incidence of poverty level of development, education etc) and hence the consequent changes in environmental parameters due to human activities depend upon the incidence of poverty, level of economic development, educational achievement etc or over all human resource development in stead of only population size, which in turn affect the population and their activities. A variation of all these factors thus causes to regional differences in degradation and may lead to the locational shift of local level degradations.

The aforesaid discussion reflects the dependence of human being on the nature and that changes in environmental parameters are the integral parts of developmental activities undertaken by the human being. Human activities in many cases lead to changes in the environmental parameters at local, regional and global level. At micro level, increasing population leads to more pressure on the resources and hence environmental conditions. The effect varies with the variation in level of income, incidence of poverty, education and overall human development. Regions with high human development are seen to observe less resource degradation. Where as the regions with low human developments are observed to experience high natural resource degradation. Data available on degradation of forest and human resource development at cross country level shows that degradation of forest is very low in the countries that acquired very high human development (Human Development Report, 2000). Only in Bahamas average annual deforestation during 1990-95 was 2.6%. In Japan, Finland, Korea, Brunei Darussalam, Argentina & Chile it was merely 0.1, 0.1, 0.2, 0.6, 0.3 & 0.4 per cent. In other cases there was either no degradation or improvement in forest area. On the other hand, degradation of forest is comparatively higher in most of the countries that achieved medium or low level of human development (Human Development Report, 2000). It was 7.5, 8.1, 2.6, 3.5, 2.6, 2.5, 2.9, 2.4, 2.2, 3.1 & 5.8 % in Jamaica, Lebanon, Paraguay, Philippines, Thailand, Jordan, Pakistan, Malaysia, Panama, Costa Rica & Comoros.

Models

Although there is a growing recognition of the important linkages between population and the environment our understanding of exactly how these linkages operate is still rather limited. We may intuitively understand that human population and their activities cause environmental change and that change in turn affects the quality and condition of human lives; but the specific details of these interactions are still largely speculative. Population environment interactions have been studied from different perspectives by different groups. The neoclassical group holds that environmental and resource degradation is not the result of population pressure rather economic inefficiencies and market distortions. If market is allowed to play freely as mentioned earlier,

resource problem will automatically be solved. On the other hand, the natural scientists follow the tradition of Malthus and argued that population is the main source of environmental degradation. Hence population control is essential for protecting environment. The political theorists however state that poverty and inequality of distribution of resources are responsible for degradation and hence the solution lies in the removal of poverty and inequality. A number of causes and explanations have been given in this paper for the regional resource degradation. The flowchart-1 describes how a number of factors interact in a circular way and lead to degradation of resources in a region.

Flowchart-1

How Population, & Poverty is linked with Environment?

Higher Population Growth
└→ **Low per capita Availability of Natural Resources**
　　└→ **Pressure on Natural resource and Environment**
　　　　└→ **Degradation of environment**
　　　　　└→ **Low productivity and income**
　　　　　　└→ **Incidence of poverty**
　　　　　　　└→ **Low Educational & Health care Facilities**
　　　　　　　　└→ **Low Human Development**
　　　　　　　　　└→ **Poor Management of Natural Resources**
└ **Further Environmental and Resource Degradation** ←┘

The flow chart-1 shows the downward spiral linkage of population growth, poverty, human capital or broadly speaking quality of life and environmental quality/natural resource. The vicious circle of environment will continue whether there is population growth, poverty, low educational and health care achievement or poor and degraded environment in the beginning. Thus there will be continuous mounting of pressure on natural resources and decline in availability unless the linkage is broken through population check and proper environment care, sustainable resource management and striking against poverty simultaneously.

Poverty and Environment or Natural Resource Use

The poor people mostly belong to the remote areas and their living conditions are directly affected by the availability of critical natural resources in their surrounding. In most cases they earn their livelihood directly from the environment (e.g., from common forest they collect fuel wood, timber, leaves and herbs for building cottage, extract food articles and some other things to sell and earn something. Also they use grazing field for raising livestock, harvest common fisheries, water bodies for drinking water and so many) (Jodha, 1986). Moreover, due to limited access to education, heath care and awareness, tendency of population growth is relatively higher among them, which put more pressure on environment and accelerate the process of environmental degradation and thereby the productive capacity of those natural resources. This in turn affects their livelihood through declining impact on their income and materials collected from nature. Thus poverty alleviation has been identified as one of the important remedies of environmental degradation (World Bank, 1987 and 1988).

However one exception is there that the poorer are not always responsible for environmental degradation. In many cases due to their better accessibility and encouraging government policy of the developed world (e.g., subsidies for fossil fuels or large scale commercial fishing fleets), they cause much more damage to the environment than the poorer. They do the damage primarily due to their unsustainable luxurious consumption of natural resources and their profit motive and also they are responsible for the creation of large-scale industrial waste and pollution (without taking proper measure for treatment), the burden of which has been mostly shouldered by the vulnerable poorer. On the other hand, many of the poorer do not have proper accessibility to those resources (may be due to lack of property right or capabilities) and even in some cases they are found to invest and judiciously manage (due to their indigenous knowledge) those resources. Whatever damage they do is mainly for their survival. Their income, opportunities and health are highly affected by the depletion or degradation of natural resources that is clear from the following facts (DFID & UNDP, 2002).

The impact of population and incidence of poverty on natural resources also depends on the institutional arrangement and nature of resources. If the resources are common property resource, with same population growth and identical poverty, it will be more prone to degradation and vice versa (Hardin, 1968; Buchanan and Yoon, 2000; Parisi, Schultz and Depoorter, 2000). Below Flow chart-2 shows the both way linkages between poverty, population and environmental degradation.

Flow chart-2

Poverty, Population, Human Development and Environment Interlinkage

Incidence of Poverty
→ Low educational and health care facilities
→ Higher population growth
Pressure on Natural resource and Environment & Poor Management
→ Degradation of environment
Low productivity and income
→ Incidence of Chronic poverty
Further Environmental Degradation
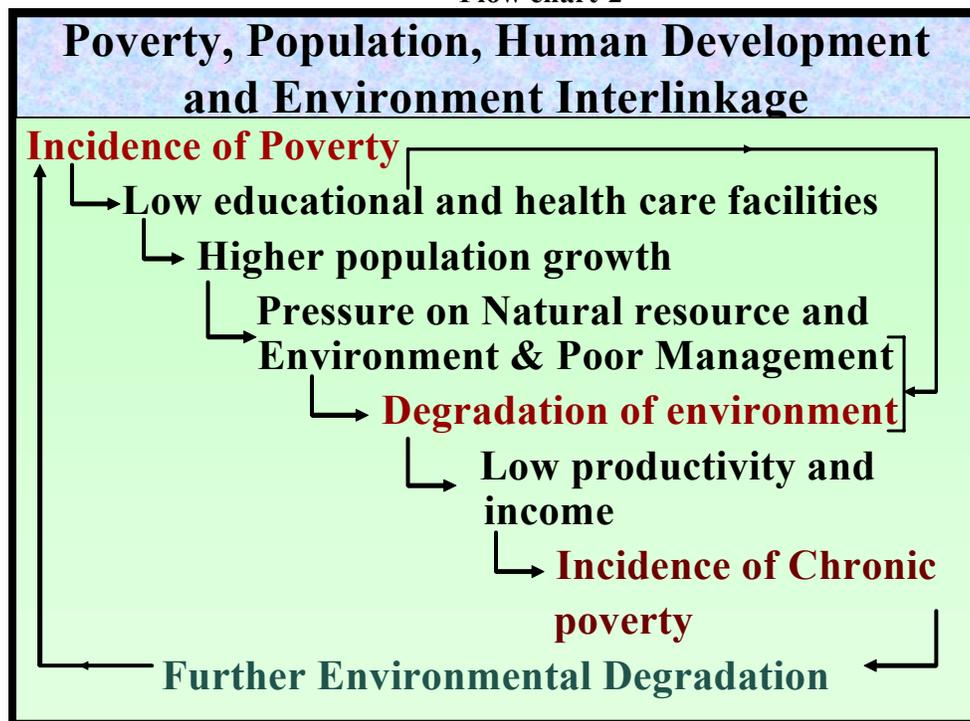
Temporal Changes in Forest Resource in the World, India and Per Capita Availability in India

During the decade of 1980s and 1990s due to the expansion of agriculture, logging, development and other human activities the deforestation of annually more than 120000 Sq Km. of forest area in the World have been observed (FAO, 2000). These trends in forest cover are undoubtedly related to the population growth though there is no simple way to describe such linkage. These in most cases are treated as the direct and indirect effect of population expansion but the relation is not found to be uniform in all the regions. Though we find a strong relationship in Central America, East and West Africa and South Asia; a much less clear association is observed in Amazonia i.e., South America and Central Africa (Rudel et al, 2000; Pfaff, 1999). Even in highly

developed country like U. S. A., Russia and also China forest cover has been recovering for some time after extensive earlier deforestation (FAO, 2000). In these countries population growth has been reduced to a significant extent and population began to shift from agriculture to non-agricultural activities and also tried to shift their requirement to non-agro-based product and sometimes import these products (whenever needed) from other regions where the effect is felt. Thus the North-Eastern part of USA that was deforested almost entirely during the middle of 19th Century is now largely regenerated. Here both population and per-capita income increase are no longer associated with local forest degradation but with that of other places as explained earlier.

The recorded forest area in India was about 68 million hectares in 1950-51 and that increased to 75 million hectares in the early 1980s and further increased to 76.5 million hectares in 1997. But the authenticity of the historical data on the forest area has been doubtful (Ministry of Environment and Forest, 1997).

Record shows that the overall forest cover has been declined from about 40 per cent of country's geographical area a century ago (Guha, 1983) to nearly 22 per cent in 1951 and further to around 19 per cent in 1997 (Ministry of Environment and Forest, 1997), which is well below the standard 33 per cent stipulated by the National Forest Policy, 1988. The forest cover declined from 71.8 million hectares in 1951 to 63.9 million hectares in 1991 and further to around 63.3 million hectares in 1997 that indicates a continuous decline of forest cover till now. Though the rate of decline has been decelerated over time due to campaign, legislation (Supreme Court's ban on felling of trees) and special aforestation programmes through JFM, community forestry, social forestry, tree growers' cooperative etc. for the revival of some degraded forest area; in qualitative terms (crown density) there has been continuous decline of forest resources. FAO (2000) assessment shows that the aggressive policy of the Government has offset some losses in forest cover and in spite of significant population growth during 1990s India could regenerate 381000 Hectares through tree plantation programmes. Despite governmental efforts through the aforesaid means this is not a significant improvement of forest resources (recorded area has increased slightly and in a scattered manner). Though the rate is declining, population is still growing at an annual around 2 per cent compound rate. Moreover, population growth, urbanisation etc. have been causing rise in demand for timber, fuel wood, grazing etc. Hence the per capita availability of forest resources is bound to decline. Of course there has been a gradual decline in per capita forest resource mainly timber, and a shift of demand towards relatively cheaper substitutes; still one cannot ignore the importance of forest for arresting soil erosion, maintaining biodiversity, productivity and environmental balance (temperature etc.) that proved to be very costly to mitigate. Foster and Rosenzweig (2003) also argued that the little improvement was due to relatively closed economy and that would be reversed if the economy is open.

In addition to poverty and faulty institutional mechanism (De, 2003), several other reasons are there for this degradation and population may be a part of it as mentioned earlier. Encroachment led the list in the diversion of forest area for non-forestry purposes between 1950 and 1980 to the order of 4.5 million hectares i.e., at an annual rate of 0.15 million hectares. Thereafter marginal decline in forest area have been recorded by an annual rate of 0.016 million hectares (*Economic Survey*, 1998-99). Illegal grazing by around 100 million livestock in the tracts of forestland also results in forest degradation in India (World Resource Institute, 1994).

Due to population growth and simultaneous decline in forest resource per capita forest resource availability declined over time that further deepens the pressure on forest resources despite the development of alternatives to forest resources and related technologies. During 1950s per capita forest area was around 1.2 hectares that declined alarmingly to 0.0666 hectares during 1997-98 and still now it is around 0.07 hectares, which is well below the world standard.

Population Growth and Stress on Natural Resource in North East India

The economies of all the states of North East India are primarily agricultural. Though there has been decline in dependence on primary activities, still now majority of the people are engaged

in primary sector. This is clear from table-1 that shows the changes in sector-wise distribution of main workers during 1971 to 1991. The reduction in dependence on agriculture has been very slow across all the North Eastern states. However, the supply of primary input of agriculture i.e., land is fixed due to nature. But population continued to grow at rapid rates in all these states. Thus per capita availability of usable land has been decreasing as is shown in table-2. As majority of people are still engaged in agriculture and its allied activities, pressure on land has been increasing. Also, fallow period of shifting cultivation has been falling drastically (from 17 - 20 years in 1970s to 2 - 3 years). Further the methods adopted to increase the productivity of land in many cases leads to decline in long run productivity of soil. Moreover conversion of forestland has been taking place to make up the shortage of cultivable land and to meet the need of increased population. So degradation of forest has been taking place to meet the increasing need of the people. The method of shifting cultivation that is widely practised in North East India is also partly responsible for the degradation of forest (Reddy et al., 2001).

Table-1
Changes in the Sector-wise Distribution of Main Workers from 1971 to 1991

	% of Main Workers in Primary Sector		% of Main Workers in Secondary Sector		% of Main Workers in Tertiary Sector	
State\Year	1971	1991	1971	1991	1971	1991
Arunachal	80.44	67.44	0.45	8.66	19.11	23.96
Assam	77.04	73.99	4.20	5.56	17.86	20.45
Manipur	71.30	70.00	12.24	9.66	16.46	20.34
Meghalaya	81.84	74.81	3.30	3.74	14.86	21.46
Mizoram	84.17	65.99	1.76	5.07	14.07	28.94
Nagaland	79.46	75.26	2.38	3.48	18.16	21.26
Tripura	76.58	64.08	4.25	6.41	19.17	29.51
N-E India	77.45	72.61	4.93	5.78	17.62	21.61
All India	72.56	67.50	10.69	12.00	16.75	20.50

Source: (1) Basic Statistics of North Eastern Region, 2002
(2) NEDFi, Report, 2002

Table-2
Per-Capita Availability of Land in North East India (Hectare)

State\Year	1971	1981	1991	2001
Arunachal	12.07	8.86	6.36	5.04
Assam	0.54	0.39	0.35	0.29
Manipur	2.06	1.56	1.20	0.93
Meghalaya	2.22	1.68	1.26	0.97
Mizoram	6.52	4.26	3.03	2.35
Nagaland	3.20	1.79	1.28	0.79
Tripura	0.67	0.51	0.38	0.33
N-E India	1.16	0.84	0.71	0.58
All India	0.55	0.45	0.36	0.30

Source: (1) Basic Statistics of North Eastern Region, 2002
(2) NEDFi, Report, 2002.

Apart from agriculture and forest base activity many people earn their livelihood from mining and its related activities. Petroleum, natural gas, coal and limestone are the major minerals of the region. In case of coal and limestone dominated Meghalaya, it was shown that if the current trend of extraction continues the coal would last 40 – 50 years (Rout, De and Das, 2005) and limestone 120-130 years (De and Kharlukhi, 2005). Oil stock of Assam has already been depleted

to a great extent and chance of finding new reserves that can be exploited economically have been declining over time. Moreover, most of the limestone and coal produced are exported either to other region of India and extensively to Bangladesh to meet their industrial needs as there are very limited industrial base in the region. Here though most of the minerals (except oil, gas and uranium) are privately owned the theory of anticommons fails to explain the reasons behind such over-exploitation.

Table-3
Changes in Population and Forest Cover in the last Decade

	Population in Lakh		% Growth of Population	Percentage Change in Dense Forest	Annual Compound Growth Rate of Forest Cover (Percentage)
State\Year	1991	2001	1991-2001	1989-1999	1989-1999
Arunachal	8.65	10.91	35.15	-0.22	- 8.57
Assam	224.14	266.38	23.36	7.33	0.75
Manipur	18.37	23.89	32.46	2.49	- 0.90
Meghalaya	17.75	23.06	32.04	-15.26	- 3.48
Mizoram	6.90	8.91	48.55	-10.70	0.08
Nagaland	12.10	19.89	50.05	-32.84	- 1.33
Tripura	27.57	31.91	31.92	-33.26	- 2.18

Sources: Census of India, 1991, 2001; Provisional Population Totals.
Government of India, Ministry of Environment and Forests, *Forest Survey of India*, New Delhi

Forest is one of the major natural resources of North-East India (which is partly owned by the government and partly by community and individuals) on which a sizeable population especially the poorer depends for their livelihood. Also it is one of the major 18 hotspots in the world. Table-3 shows that there is a general decline in forest cover in all the North-Eastern states except Assam and Mizoram. Degradation in area under forest is the highest in Arunachal and lowest in Manipur. Tripura and Nagaland recorded significantly higher degradation of dense forest. In Assam population growth is comparatively low and there is improvement of forest cover, which may be because of successful aforestation programme and educational improvements. Though population growth is higher in Mizoram, still forest cover increased though insignificantly. If we compare the population growth with the degradation of all the North-Eastern states it can be safely asserted that per capita availability of forest resources has declined. Comparing with the other states of India, the degradation was found to be on the higher rate in the north-eastern states, which may be due to the practice of traditional *jhum (shifting)* cultivation (Reddy et al, 2001). Rao (1994) has also identified population growth as another cause of degradation in this region as population has been increasing at significantly higher rates as compared to the forest cover and hence the per capita forest cover decreased and the pressure on forest is mounting. It is compounded with the higher incidence of poverty, which has been higher than the national average and only below the state of Bihar and Orissa.

Poverty, Per-Capita Income and Change in Forest Cover in North East India

Though there has been decline in incidence of poverty across all North Eastern states it is still higher than the national average. The rate of decline also varies across the states. The highest rate of decline was observed in the successful state Mizoram (from 36 per cent in 1983 to only 19.47 per cent in 1999-2000) i.e., by 45.92 per cent where literacy and other human development indices are also higher. It was lowest in Assam where percentage of poverty declines from 40.47 in 1983 to 36.09 in 1999-2000 i.e., by only 10.82 per cent. Table-4 shows the rate of changes in incidence of poverty in North Eastern states during 1983 to 2000.

The theory of Environmental Kuznets Curve (EKC) says that the degradation of environment first rises with the rise in per capita income and reaches a maximum and thereafter it declines with further rise in per capita income due to positive income elasticity of demand for environmental quality (Shafik and Bandyopadhyay, 1992; Seldon and Song, 1994; Grossman and Krueger, 1995). Therefore a similar kind of relationship is expected to exit due to the same reason between quality of environment/ natural resource and per capita NSDP. Also spread of education makes people more conscious about the management of natural resources and enhances their productivity. On the other hand, management of resources is essential for maintaining the productivity and earning of the people.

Table-4
Changes in poverty in North East India (Percentage)

State\Year	Incidence in Percentage			Changes in Percentage		
	1983	1993-4	1999-00	1983 to 1993-4	1993-4 to 1999-00	1983 to 1999-00
Arunachal	40.38	39.35	33.47	-2.55	-14.94	-17.11
Assam	40.47	40.86	36.09	0.96	-11.67	-10.82
Manipur	37.02	33.78	28.54	-8.75	-15.51	-22.91
Meghalaya	38.81	37.92	33.87	-2.29	-10.68	-12.73
Mizoram	36.00	25.66	19.47	-28.72	-24.12	-45.92
Nagaland	39.25	37.92	32.67	-3.39	-13.84	-16.76
Tripura	40.03	39.01	34.44	-2.55	-11.71	-13.96

Source: Planning Commission, Government of India.

Even though owned by the community or the government forests in North East India are mostly open access common forest and that is why in many cases even the legislation fails to protect unless and otherwise protected through the participatory management or by the community. Now we shall try to look into the relationship between degradation of forest and Per Capita Income as well as incidence of poverty.

Table-5
Poverty, Per-Capita Income and Changes in Forest Cover in North East India

State	Poverty in 1999-2000, Percentage	Per Capita Income 1999-2000 (at 1993-94 prices)	Changes in Forest Cover in 1995-97 (Sq. Km)	Percentage Changes in Poverty Ratio	
				1993-94 to 1999-00	1983 to 1999-00
(1)	(2)	(3)	(4)	(5)	(6)
Arunachal	33.47	9170	-19	-14.94	-17.11
Assam	36.09	5978	-94	-11.67	-10.82
Manipur	28.54	7231	-140	-15.51	-22.91
Meghalaya	33.87	7826	-55	-10.68	-12.73
Mizoram	19.47	8109	199	-24.12	-45.92
Nagaland	32.67	9118*	-70	-13.84	-16.76
Tripura	34.44	6813	4	-11.71	-13.96
$R_{24} = -0.723, R_{45} = -0.77, R_{46} = -0.792, R_{34} = 0.233$					

Note: (1) * For Nagaland the data on per capita income was taken from 1998-99 year as it was not available for 1999-00. (2) R_{ij} represents the correlation between i^{th} and j^{th} column.

Observation and Discussion

The direct correlation between population growth and degradation of forest cover is not significant (0.05 only) across the North-Eastern states in India. But there is no doubt that population

creates pressures indirectly on the resources as is reflected from the variation in per capita availability of resources, income, poverty and degradation. That is clear from the correlation between population growth during 1991-2001 and degradation in dense forest during 1989-99 in North East India, which is -0.51.

From the results we also observe that there is a significantly inverse correlation between the incidence of poverty and the degradation of forest. Also we observe similar kind of inverse relationship between the changes in poverty and the degradation of forest. The results indicate that the degradation of forest (either due to shifting cultivation or other reasons) increases with the decline in poverty in North East India.

Similarly we observe that the correlation between changes in forest cover and per capita income is positive but not so strong. It indicates that as per capita income rises, degradation of forest cover also rises. Even if we take the annual compound rate of degradation of forest during 1989 to 1999 a similar result is observed.

The results may appear to be inconsistent along with inverted U hypothesis. The fact is that all the North Eastern states have per capita income well below the national average. Moreover it is associated with high inequality, which is clear from the incidence of poverty. Hence many of the families still face the survival problem and hence they earn mostly from the forest. Poorer possibly uplifted them at the expense of easily accessible forest resource.

The positive correlation between per capita income and degradation of forest is due to fact that theses states are still in the rising phase of Environmental Kuznets Curve (EKC). Per capita income of all these states is well below the national average (over Rs 10000) per capita income. They are yet to reach the peak per capita income and the technology after which their dependence on forest will be declining and they will have sufficient alternative opportunities. But the positive relationship between per capita income and degradation of forest is not significant, which may be because of the government policies and initiatives through joint forest management, community forestry, social forestry programmes etc that help protecting and regenerating many forest areas during last two decades. Andrew Foster has shown that economic development in India was associated with the rise in demand for natural resource (forest resource) that led to an increase in its supply during 1971 to 1999 (Smith, 2003). Among those states Mizoram and Tripura occupies top two positions in terms of educational achievement (e.g., higher literacy rate and enrolment ratio) and we observe improvement in forest resource or relatively less degradation there.

Conclusion

Though population growth is not found to be directly related to the degradation of resources in many cases, it indeed put pressure on the natural resources at least at the local and regional level. In addition to the pattern of livelihood, incidence of poverty and institutional arrangement, population growth can also add to the problem of degradation.

The effect is more if technology does not grow at the desired pace and sufficient alternatives of natural resources develop and unless people are able to produce continuously increasing amount from the identical resources. Thus it is not only the size of population but also the effective human resource development that matters much for resource utilisation and environmental degradation.

Moreover the market distortions, inequality in income, educational advancement etc. and regional disparities may play their important roles in inter-regional differences in degradation of resources. Thus none of the factors alone is responsible and we should address all the factors simultaneously. Joint management or participatory management in many cases have been found successful in case of open resources (De, 2003).

Thus whatever Simon predicted from the examples of a few countries and over all world progress may not be applicable to the regions that are yet to achieve the level of development from which, environmental degradation and resource depletion starts improving. Moreover it would not be wise to allow degradation to continue till market establishes the balance (as there is uncertainty how long it would take to do so) and that may jeopardise our life. Also it is very difficult to say

whether establishment of perfect market at global level is possible or not. Moreover there is the lag in adjustment.

Thus even though human being whenever confronted with some problems or crises (either due to population pressure or any other reason) they successfully overcome those through technological invention and their implementation; it will not be wise to leave it for natural automatic solution. It is true that unless people were aware (for whatever reason) population would be much more than six billion, what is today and the problem would have been aggravated. It may also be the setback of many regions in terms of resource management and growth unless the benefits of technological development reach to all uniformly.

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Natural Resoures

The Impact of HPAI of the H5N1 Strain on Economies of Affected Countries

Ceyhun Elçi
London South Bank University

The epidemic of the Highly Pathogenic Avian Influenza (HPAI) of the H5N1 strain is causing major economic problems to affected countries, mostly in South-East Asia. The poultry industry is the most devastated, with major losses. This paper assesses the impact and cost of an epidemic of this nature on affected economies. The paper evaluates the economic impact from the poultry industry to the governments and even further to the international level, as the epidemic has no consideration of borders. With the world at the crossroads of a global pandemic, the economic impact will also be considerable at the international level. With the use of forecasting models the affects of the epidemic will be evaluated. The impact to affected countries economies are not just national based, for those with the endemic H5N1 strain are socially burdened with sustaining or even intensifying resource-intensive activities and as a consequence are left with shouldering economic losses in order to safeguard international public health. This at a major level will require the cooperation of the international field, with increased global integration the financial responsibility will be left to the international countries, to make sure all is coherent. The paper in particular assesses the economic impact of the poultry industry for the affected countries. Within these countries the poultry industry is seen as a major sector and the consequence of this pandemic has been the death of poultry from the disease itself and the culling of poultry to stem its spread. Both these factor are leading to significant costs to the poultry industry and to the Governments of the affected countries in containing the epidemic. The increase in costs can be seen in terms of equipment, materials, transport and personnel, that are required to keep a control on the spread. The impact will be qualified by the assessment of GDP and modelling the losses of trade and Government expenditure in controlling the spread of the disease and subsidiaries that the government would have provided to farmers of diseased Livestock for compensation. The results of the impact will have a major impact on the development of the affected regions. The loss of a major source of income from the trade of poultry will have serious consequences on the balance of payments and Government Debt. The cooperation of the affected countries through information will help and lower the overall impact to each country. However the total impact will depend on the transfer of information between affected economies, and the period of time the epidemic will last and if H5N1 begins to transfer to humans.

Introduction

The epidemic of the Highly Pathogenic Avian Influenza (HPAI) of the H5N1 strain is causing major economic problems to affected countries, mostly in South-East Asia. The worst countries affected in this region are Cambodia, Indonesia, Thailand and Vietnam. The outbreak that began back in 1997, Hong Kong and became an all-Asian pandemic in 2003. Has had a number of important characteristics upon trade and therefore the industrial effect of livestock and poultry has been of great importance, in the past decades. Trade in these commodities have been significant sources of economic growth for a number of these affected countries. However trade and economic growth has been distorted, through non-traditional protectionist measures or barriers imposed by governments, and also through the problems of health and safety. Trade has been affected by the spread of animal disease, which has lead to major uncertainty for the future of these commodities and its impact on the GDP of affected countries. The international environment has seen in the past decade two major outbreaks, Avian Influenza (AI) and Bovine Spongiform Encephalopathy (BSE), causing havoc to a number of economies. However the impacts of these outbreaks vary, not just in regards to the type of the disease, but in reference to the costs of maintaining the spread and furthermore eradicating the problem (the disease). Therefore, reference needs to be made to the economic structure of the affected countries, for example, Thailand's poultry industry is heavily dependent on exports, which means the structure of affected commodities in relation to GDP will be an important factor to assess.

Furthermore the consequence of a disease outbreak deteriorates the confidence within the product in question, in this case the poultry industry. As confidence is questioned, trade is affected and exports become negligible, and therefore the excess supply of non-diseased poultry will be sold domestically at lower prices, as foreign markets restrict imports from these countries. This paper examines the impact AI has on affected countries. The paper hereafter aims to better understand the following:

i. The HPAI of the H5N1 strain in South-East Asia,
ii. The poultry industry,
iii. The impact on affected economies – cost of an epidemic, and
iv. The international impact - an epidemic with no borders.

Literature

The highly pandemic stance of H5N1 strain in previous outbreaks, e.g. Italy, cf. Mannelli, *et al* (2006), Capua, *et al* (2004), and Schäffr, *et al* (1993) can be seen through many studies cf. European Commission (2004), with more recent studies since the outbreak of the East Asian AI, cf. FAO (2004), Shortrideg, *et al* (1998) and Webster, Cox and Stohr (2002). The FAO study concludes the position of continuing outbreaks that began back in late 2003, and elaborates on its disastrous affect on the economies of affected countries. The pathogenic nature of the H5N1 strain makes recommendations on the prevention, control and eradication, a difficult scenario. For despite control measures, the nature of the disease continues to spread internationally, causing considerable concern not just in East-Asia, however internationally, as can be said, the HPAI of H5N1 strain does not recognise borders. With the migration nature of birds this further disseminates the need for concern, as the disease is free to cross these borders. The major world animal and human health authorities that are the FAO[5], OIE[6] and WHO[7], play an important role in providing global strategies

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[5] FAO - Food and Agricultural Organization of the United Nations.
[6] OIE - L'Office International des Epizooties - World Organisation of Animal Health.
[7] WHO - World Health Organization.

and regional plans to minimise the HPAI threat, cf. FAO (2004), Delquigny, *et al* (2004), and Bolteron and Aquilino (2004). Studies show that AI of HPAI is an animal problem, however studies also identify the foreseeable future of a human influenza pandemic stating that in most instances this is "*both overdue and inevitable*" (World Bank, 2005).

However reflecting back to historical epidemics the affects may not be as considerable, for instance the pandemics of 1957-1958 and 1968-1969 were comparatively placid. But there is the belief that the H5N1 strain, could gradually mutate and become of more concern in human-to-human transference, that shall be discussed later, which could be in the terms of the global pandemic, like the "Spanish" influenza of 1918-1919. However with further devastating affects as the international environment has grown faster and as international trade in commodities, is a major economic growth instrument. For example, poultry is traded from Brazil to Europe and Japan, trade is intense. The connection between H5N1 and the terms of international trade in relation to the economic impact will be assessed here within.

HPAI is an area of major importance with global influence. The United Nations FAO and WHO are the most important researchers. The link between these institutions and the H5N1 outbreaks is of primary health and safety. That provides information and sources of recommendation in handling the outbreaks. However the WTO and the World Bank's stance on the subject are of trade recovery. An assessment made by Brahmbhatt (2005), identified the economic costs of the SARS outbreak in East-Asia, similar impacts are possible to be seen from an AI-H5N1 strain. Pervious surveys by UNESCAP[8] assessed the full-scale of the AI outbreak in Asia, stating losses of approximately US\$ 10 billion in GDP terms during December 2003 to February 2006.

The composition of HPAI restricts international trade in live birds and poultry meat and therefore has an impact upon the economic system. Leslie and Upton (1999), state that in countries that the poultry export industry has been developed and considered as an important proportion upon a country's GDP, the impact will threaten investment, employment and international trade. Furthermore cf. Leslie and Upton (1999), believe in the positive benefits. The reappearance of diseased commodities can be handled with more care as information transfer is freely allowed.

H5N1

The epidemic of the Highly Pathogenic Avian Influenza (HPAI) of the H5N1 strain is an extremely contagious viral disease that at present spreads between animals caused by the influenza A virus (family Orthomyxoviridae) that is sub-divided as the basis of the hemagglutinin antigens (H1-H16) and neuraminidase antigens (N1-N9). The trade aspect of the disease outbreak is of importance under the SPS[9] agreement, to safeguard health and safety of animals, regulated by standards of Animal health code through the L'Office International des Epizooties (OIE).

The HPAI virus of concern within this recent outbreak is an infection on poultry caused by one of H5 or H7 influenza A virus', in this case the H5 sub-strain. Determined by the result of the viral's mortality rate. The outbreak of H5N1 has gained ground since 1997 in Hong Kong, among wild birds and poultry spreading from South-East Asia to Central Asia and Eastern Europe see Table 1.

Table 1. Outbreaks by season 2003-2005

Season	Outbreaks
Winter 2003	367
Spring 2004	114
Summer 2004	414
Autumn 2004	596
Winter 2004	1160
Spring 2005	52
Summer 2005	44

[8] UNESCAP - United Nations Economic and Social Commission for Asia and the Pacific.
[9] SPS - Sanitary and Phytosanitary.

Autumn 2005	441
Total	3189

Source: FAO (2006)

Table 2. Outbreaks by Country and Season 2003-2005

	Season								
	Winter 2003	Spring 2004	Summer 2004	Autumn 2004	Winter 2004	Spring 2005	Summer 2005	Autumn 2005	Total
Cambodia	9	2	:	1	:	:	:	:	12
China	50	:	1	:	1	3	1	37	93
Croatia	:	:	:	:	:	:	:	3	3
Indonesia	6	:	:	2	76	45	:	:	129
Japan	9	1	:	:	:	:	:	:	10
Kazakhstan	:	:	:	:	:	:	1	:	1
Korea	7	:	:	:	2	:	:	:	9
Kuwait	:	:	:	:	:	:	:	1	1
Laos	19	:	:	:	:	:	:	:	19
Malaysia	:	:	:	5	:	:	:	:	5
Mongolia	:	:	:	:	:	:	2	1	3
Romania	:	:	:	:	:	:	:	29	29
Russia	:	:	:	:	:	:	:	10	32
Thailand	183	7	93	582	122	3	18	41	1049
Turkey	:	:	:	:	:	:	:	5	5
Ukraine	:	:	:	:	:	:	:	17	17
Vietnam	84	104	320	6	959	1	:	297	1771
Total	367	114	414	596	1160	52	22	441	3189

Source: FAO (2006)

Poultry Industry

Taking the Thai and Vietnamese poultry industries, similarities can be seen; the poultry industry has been in commercialisation; however it still has similarities with the Cambodian and Laos poultry industries that are dominated by backyard systems. These are more prone to outbreaks than clean advanced poultry systems. Thailand has the most advanced system with a majority of the poultry production system involved in clean plant production, with minimal human interaction (Rushton, *et al* 2004). This has lead to the decline of traditional poultry farming techniques and adoption of advanced integrated poultry farming within modern facilities. This is seen as the best way to reduce potential outbreaks. However the same small number of backyard producers, still are potential threats to both these facilities and outbreaks.

Thailand is the fourth largest exporter of poultry in the world with 7 and 12 percent in volume and trade respectively, the Thai poultry market is estimated at approximately, US\$ 1.17 billion annually (Costale, 2004). Similarities in the importance of the poultry industry can be seen through many South-East Asian countries however with less turnover of revenue.

Impact on Affected Economies

To assess the impact of an AI, H5N1 outbreak within affected countries a macro and micro economic approach can be taken, cf. Verbiest and Castillo (2004). The impact is different depending upon the country and its commitment to the poultry industry. For example, Thailand an economy with a considerable poultry industry, the impact of H5N1 has been 1.5 per cent of GDP and Vietnam with a loss of 0.3-1.8 per cent of GDP, (FAO, 2004). The factors that have been the impact of these losses are culling and affected poultry flocks, resulting in the largest decline of 15 and 20 percent in Vietnam and Thailand respectively.

The main economic impacts are seen by the rural poultry industry in several South-East Asian economies. However the macroeconomic cost is relatively unimportant. Verbiest and Castillo (2004) state this to be the case as well, because the poultry industry is not of great importance as

indicated by its limits to the region of 0.1-0.2 percent of GDP in Vietnam. However the impact of H5N1 does have a relatively micro impact, in particular in the South-East Asian region that has a high level of small farmers dependent upon poultry production. The small farmers are in most cases poor or low income families, who are more reliant on poultry as sources of income. Therefore the cost of compliance in the eradication of AI has overwhelming costs, in culling and restocking of poultry in order to continue the required production levels, to maintain their livelihood. The costs are hard to maintain as financing becomes a major problem. This leads on to the two categories of costs, direct and indirect costs. Compensation is usually a direct cost to both encourage compliance and inform national and international organisations, the other reason is to compensate and support small rural farmers. However direct support in most South-East Asian Economies is difficult due to the fiscal expenditure constraints. However direct and indirect have their costs and benefits that can be accurately quantified in some aspects and estimated in others.

The major costs occurred as a consequence of HPAI of H5N1 outbreaks have been the cost of loss on poultry production through the spread, and the other costs have been to the government in containing the epidemic through government expenditure on equipment, material, transport personnel and a taskforce to tackle the outbreak. The major South-East Asian economies have seen direct costs, in the region of 140 million birds culled and the stated costs of containing the epidemic is in the region, of approximately US$ 10 billion (World Bank, 2005).

For affected economies the impact has been the distortion of trade with the imposition of SPS measures by importing countries. For instance the FAO (2006) explained that with the detection of new AI, many countries took the protectionist route. This has been through the use of WTO regulatory agreements, established by SPS measures under the OIE to immediately impose standards that resulted in immediate declines in poultry consumption, affecting Thai exports from 5.1 million tonnes to below 70,000 tonnes from 2000 to 2004 relatively, see table 3. The cost of these regulatory practices have resulted in a decline in poultry revenue of US$ 3.6 million to US$ 123,000 relatively, see table 4.

Table 3. Chickens Exports - Qty (1,000)

	Year				
	2000	**2001**	**2002**	**2003**	**2004**
Far East	107,381	98,567	103,011	96,877	59,787
East & South East Asia	57,475	54,248	57,666	53,161	36,330
Brunei Darussalam	0	0	108	0	0
Cambodia	0	0	0	0	0
China	47,579	41,283	42,255	38,588	19,187
China, Hong Kong SAR	22	8	1	14	2
China, Macao SAR	0	1	2	2	0
Indonesia	1,325	1,017	628	508	6
Korea, Republic of	110	174	256	231	0
Malaysia	49,569	47,878	50,650	47,650	36,012
Myanmar	0	0	0	0	0
Nepal	0	0	0	0	0
Philippines	130	93	641	185	240
Singapore	1,246	818	951	163	3
Thailand	5,095	4,268	4,432	4,424	69
Total	272,238	251,382	263,688	246,915	155,904

Source: FAOSTAT (2005)

As table 4 shows, the impact has been felt by most of the South-East Asian affected economies, with general declines in the region. This in total in 2004 resulted in an 8 percent decline in South-East Asian international trade with a 36.8 percent decline in South-East Asian poultry trade. As a result of major production sources, with reference to South-East Asia, the result has been a loss of major competitive sources and in result a 30 percent increase in international poultry prices, as importation became restricted and competition declined with less supply.

Table 4. Chickens Exports – Value (US$ 1,000)

	Year				
	2000	**2001**	**2002**	**2003**	**2004**
Far East	174,949	159,727	166,516	154,533	100,655
East & South East Asia	73,748	83,224	84,903	85,009	64,062
Brunei Darussalam	0	0	15	0	0
Cambodia	0	0	0	0	0
China	99,791	75,399	80,304	65,713	33,103
China, Hong Kong SAR	595	164	11	23	4
China, Macao SAR	0	2	3	5	0
Indonesia	2,748	1,371	1,593	1,249	5
Korea, Republic of	177	268	489	452	0
Malaysia	65,810	76,221	76,058	76,513	63,333
Nepal	0	0	0	1	1
Philippines	267	145	914	410	585
Singapore	1,150	578	406	175	16
Thailand	3,595	4,641	5,428	6,210	123
Total	423,645	402,678	417,935	394,075	265,372

Source: FAOSTAT (2005)

In comparing all recent outbreaks of AI for example, the 2003, Netherlands and 2004, North American. The Asian crisis has been the most significant and devastating. With Thailand and Vietnam being the worst affected with a reported 1,049 and 1,771 outbreaks respectively, see table 2, totalling 50 million poultry being slaughtered, (FAOSTAT, 2005).

The direct economic costs seen in South-East Asia is the loss of poultry and the cost of compliance through compliance of SPS-OIE codes, that have major costs in the certification and laboratory testing of products. Which have affected trade with direct costs to the production system, costing approximately 0.1-0.2 percent of GDP in economies like Thailand. However most of the influence is felt by the individual rural households that have been compensated partially. Furthermore the direct costs of having to deal with the outbreak and control its spread has direct economic costs to a country that can range from 0.2-0.3 percent of GDP, in an economy like Vietnam where most of the poultry production is still backyard production. However in economies like Thailand and Indonesia, where most of the production is commercialised, the impact is felt through industrial bankruptcies, high unemployment, lose of profits, and cost of restructuring. Plus government expenditure through compensation used to gain accurate data on outbreak figures that may otherwise be concealed.

Therefore economically reducing a government's balance of payment and therefore the burden therefore is an imposition of fiscal resources. The external factors affecting cost resulting in indirect costs to international countries are for example, a fall in tourism and the loss of labour hours as the workforce change their routines, because of disease fear. In most of East-Asia this has not been a major factor so far, see table 5, travel numbers are persistent and have not been affected in most circumstances.

Table 5. Tourism in South-East Asia (Million's)

|	Year				
	2000	**2001**	**2002**	**2003**	**2004**
Cambodia	0.46	0.61	0.79	0.70	1,06
China	162.24	177.92	203.85	174.06	257.38
Indonesia	5.06	5.15	5.03	4.47	5.32
Malaysia	10.22	12.78	13.29	10.58	15.70
Philippines	1.99	1.80	1.93	1.91	2.29
Singapore	7.69	7.52	7.57	6.13	8.33
Thailand	9.51	10.06	10.80	10.00	11.65
Vietnam	2.14	2.33	2.63	2.43	2.93
Total	199.31	218.17	245.89	210.28	303.6

However apart from all the costs, there are some benefits from an outbreak of highly infectious pathogens; the benefits seen can create changes in systems, providing efficiency to a system that lacks control. Providing harmonisation and transparency between systems, as standards can reduce costs and compliance can advance technical facilities regarding animal, human and plant life, satisfying minimum residuals that will lower the risk of outbreaks. Therefore benefits do exist; controlling HPAI can provide considerable reductions in disease outbreaks that may otherwise have not been achieved. The affected South-East Asian countries have faced considerable problems with the HPAI, H5N1 strain outbreak. However, "*no single country can protect itself against an influenza pandemic, and the importance of actions undertaken in one country may well have implications of the well-being of the rest of the world's population that are incalculable*", as stated by the World Bank (2005: 123). This takes the impact to another level that explains the impact of such outbreaks are never just kept within the affected countries' borders, but has indirect affects to the international environment as international integration is on the increase.

International Impact

The highly infectious nature of HPAI will require an international control to handle and control a number of approaches that will reduce outbreaks. The international environment has major concerns and interests with the South-East Asian outbreaks that have gradually advanced internationally. The reasons for the international developed environment showing such interest is because of the possibility of an epidemic within developed countries. The economic cost is of great concern to many of these developed countries.

Furthermore the international environment is concerned with the possibility of the strain mutating and infecting humans that could have devastating economic effects, for if the epidemic evolved to human transmission the economic cost would be vast, more than the impact evaluated of the trade in just poultry. The WHO (2004) estimated the human casualties would be between 2-7.4 million deaths. This is considerable and the human loss would be felt with a loss of workforce labour, being detrimental to the economy. This is not a hypothetical scenario; the world has seen a number of cases within the last 9 years. The possible scenario of transmission has been evaluated by USGS. This can be seen in figure 1, showing the link of transmission between poultry to birds and humans. The scenario is made easy here; however even so, the possible transmission pathways for AI are not seen to be much more complex, considering the historical data on infection. The point of the pathway that is of importance is the mutation to human-to-human transfer, which has not been seen yet.

Fig. 1. Possible transmission pathways for Avian Influenza.
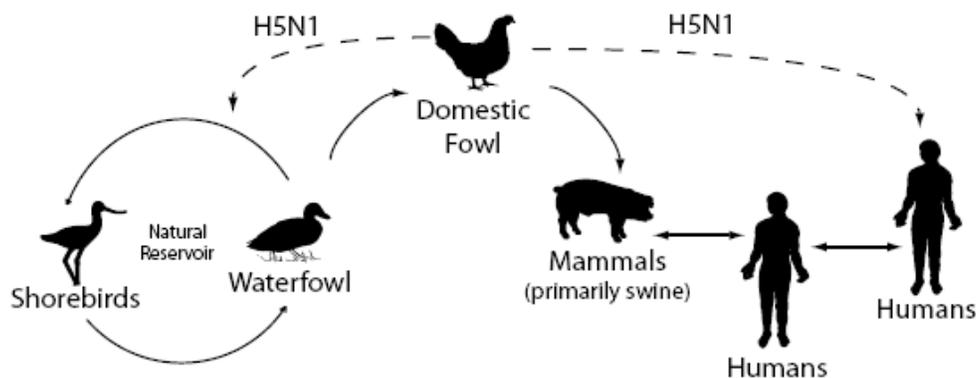
The international factor that is important is the transfer of information, the element of concern is the responsibility to control the outbreak and transfer of information of outbreaks and an affected countries ability to maintain and provide information. It may be that the countries in many of these cases are developing and generally poor or middle income per capita economies that will find it relatively expensive on resources. Therefore distorting trade through two categories, this being the compliance of SPS measures that shall transfer efficient resources that are scarce and the second factor is the backlash from the reputation of diseased products that can affect the exportation of other important products, produced by these economy's. This is a problem as the country will loss economically. However, the international integration and the free transfer of information have major opportunities through a coordinated intervention system, and therefore it is in the interests of all countries to integrate and work together in tackling a pandemic virus and its spread, in order to improve trade and reduce any potential economic impact of such outbreaks.

Affected countries fully acknowledge that containing and eradicating the H5N1 outbreak would be a desirable objective for all nations, even if the short-run cost is vast. This is justified, for any long-run cost would cause more problems. Furthermore the global public health implication of the potential emergence of the virus as the next human influenza pandemic is a possibility. Therefore these countries with the HPAI of the H5N1 strain endemic must sustain (and perhaps intensify), resource-intensive activities and therefore "*shoulder the burden of economic losses in part to safeguard international public health*" (World Bank, 2005). Assisting them with the financial costs of doing so is clearly an international responsibility, as the possibility of infection is equally likely to affect any country as those that have been affected.

On the international front the WHO has taken the position to draw-up recommendations and guidelines for pandemic preparedness and is "*developing a model country plan that will allow countries to assess their state of preparedness and identify priority needs*" (World Bank, 2005). However these are long procedural reports that take a long-time and are usually extremely costly for developing nations to implement. Therefore the international environment must play hand-in-hand, with the affected countries to develop plans for the control and future eradication of micro impacts of a disease. The outbreak must establish policies that shall bring together all stakeholders, the entire international environment. The harmonisation of standards and industrial production facilities and systems is gaining ground. However it is important to identify key international points that affect all economies. The integration of economic systems, has to be shown in integrating important health and safety concerns, that can also reduce the cost of tackling the outbreak, and also have a potential in stabilising international funds that can help sustain the financial clean up.

The future impact in uncertain, considering the mutation of the virus and its affect on humans and the transfer from human-to-human, if this occurs it will definitely have a global devastating impact. However the impact could be seen earlier with the fear factor. As for example, with the SARS outbreak the impact was seen through human perseverance factors upon the economy. Individuals changing routines to avoid becoming infected that leads to the loss of labour hours and furthermore the impact of public policies that try to control the spread through quarantines, restrictions, which affect economies through the loss of revenue in tourism, transport, retail, and services. Therefore a global pandemic would be huge considering output and input, reducing productivity and the redistribution of resources.

The international collaboration of the WHO, FAO and OIE provides a good starting strategy to help control HPAI, there strategy is a "*master coordination plan be prepared with a global vision defining the road map and time frames for the short, medium and long-term priority activities, to be endorsed and supported by individual countries and regional organisations*" (FAO-OIE, 2005: 2) that helps the international and national organisations bring together ideas to support cost-benefit scenarios that will provide better incentives to nations to adopt SPS measures. However as stated the cost factor is of most importance and more work needs to be done, with close collaboration with low income developing nations.

However further action needs to be taken, as the world is inadequate in its capacity of investment, fiscal and resources to eradicate HPAI. Actions that can be taken are developments in sustainable human and physical resources. That will develop socio-economic policies to evaluate the affected economies. Other routes that need to be taken are the development of improved vaccines and rapid diagnostic tests that shall provide more efficient and productive economies. In addition understanding the production and marketing systems and the risks associated with outbreaks, an effective disease control system can help restructure the poultry sector. A final action would be country-specific policies that would be to comply with international WTO SPS measures. That provides the basis for a restructuring facility for example, the poultry industry.

The indirect cost of human output would depend on the extent and length of the epidemic and furthermore the demographic structure and its resources to comply. Costs are in the form of Government prevention, increased standards, surveillance, diagnosis, culling and vaccination, all significant costs to any economy. However if nations are to eradicate H5N1 and its impacts they must understand the impact and possibly abide to WHO (2005) policies that covers monitoring cf. WHO (2005).

However when considering the developed countries, even if they seem to have the technology and resources to handle an outbreak they are not immune to the social and economic costs associated with such outbreaks. In most cases it is estimated that affects would be similar to South-East Asian Economies or even more devastating, with major losses in labour working hours and change in consumption behaviour. This has been seen among Europe, with the consumer fear towards poultry with consumption shocks, ranging from a dramatic 70 to 20 percent in Italy and France respectively. This has not only been limited to imported poultry the impact has been seen in demand decline for EU poultry as the AI outbreak moves westwards. This indicates that the cost impact has not only been upon the affected countries. But has already advanced to the international markets affecting the poultry industry in developed countries, further costs have occurred in Europe with the establishing of security zones with the increased surveillance to regulate the influx of diseased produce, which are all-in-order to maintain control of AI inflections. However this policy is not cheap and maintaining these policies, increase costs to the European states.

Even, so the most dramatic impact has been on the poultry industries of the East-Asian farmers. The prices have declined in juxtaposition of the decline in consumption. See table 4, indicating the decline in poultry revenue as a consequence of a decline in international poultry polices and the affect of H5N1 outbreaks. The results have been declines of 24.6, 49.6, 17.2 and 98 percent in South-East Asia, China, Malaysia and Thailand respectively.

The largest impact of HPAI to the South-East Asian affected economies has been through trade. The South-East Asian economies account for one forth of global poultry trade[10]. As a result of the H5N1 outbreak the result has been a decline of imports from these affected countries, as import oriented countries change to other non-affected suppliers such as the United States and Brazil. However as a consequence this has increased prices by 45 percent in some cases from pre-ban price levels (EMPRES-FAO, 2004). This has been as a consequence of poultry resources being transferred to less efficient sources as the South-East Asian economies that have a comparative advantage, can no longer sustain trade as an impact of the H5N1 outbreak.

The problem however faced by the international environment is the non-availability of perfect information on the global platform, the first point is, that it is expensive and secondly many countries fear backlashes from the exposure of infections that as a result will affect other sectors of the economy. Therefore many infected governments take their own stance in defining national strategies according to sovereignty and national biological, epidemiological, economical, political and social factors relevant to the country. However this strategy is not without its problems for example, the individual strategy provides a "Petri dish" (because of lagging information) for

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[10] This includes re-exports form China, Hong Kong SAR and China, Macao SAR.

outbreaks outside the affected country which could result in faster infections and higher economic costs to other economies.

Conclusion

Therefore to adopt harmonised strategies as set out by the WHO pre-pandemic mandate, countries may be able to prevent the spread of HPAI in those countries that are currently infected, but each country may have different requirements, in the short-run. Therefore, in the long-run they should be the same, to eradicate the HPAI and prevent its spread to HPAI free economies.

This means policy makers need, to understand the threat and give top priority without delay, investing the necessary resources to reduce any long-term impacts, in result maintaining the costs to the short-run. The systems must work with full transparency and harmonisation of information, so that the epidemic may be handled with care and as quickly as possible. As stated by Ferguson *et al* (2005) through the use of a simulation model, by targeting a mass prophylactic use of antiviral, the pandemic can be halted in the short-run.

Further possibilities to reduce the industrial and economic impact could be through insurance schemes that can compensate and have a cost effective approach in controlling trans-boundary animal disease directly. This may strengthen international and regional cooperation. The benefits that have come out of the AI outbreaks in Asia are the heightened awareness, therefore increasing the transparency of information that affects public perception and would result in preventive measures that can reduce mistakes and halt any further expansion of outbreaks. The benefits of the AI are the building of cost-effective monitoring and control systems forming a good basis of other diseases. For example, in Thailand it has helped identify the factors that may help in future outbreaks.

Under SPS measures it would be the best route for all poultry producers to satisfy ISO 9001:2000 standards, in supply chain facilities in terms of trading, the sanitary of equipment and facilities, the receiving and transportation of produce, which should be controlled under ISO standards to maintain a tracing and recall system that can continually improve the system and prevent the occurrence of infectious disease. By conforming to relevant international and national regulations, established by the WTO's SPS measures, which should be adopted by all, even if not a member of the WTO as it can help lower the impact on H5N1 affected countries. However this requires close collaboration between all stakeholders from farmers, suppliers, intermediaries, official agencies, and governments, international organisation like the OIE and Codex and finally the consumer. Even though this may increase cost in the short-run, cost of compliance benefits will be seen in the long-run through the reduction of large economic impacts from outbreaks. Therefore compliance seems to be a necessity, countries that do not comply with international or national regulations to eliminate H5N1, either find it difficult or are less induced to comply, believing the compliance will outweigh costs of non-compliance or that the compensation is not well balanced.

In conclusion it would be beneficial for South-East Asian poultry producing countries to adopt a closed house system that provides more structure, lowering the risk of infection. Therefore lowing potential costs from losses and restructuring of standards and trade distortion. This has been seen through large exporters putting pressure on governments to limit small farmers that are more prone to outbreaks. This may eradicate the disease; however it must be deliberated with regards to production levels of small producers. Therefore in conclusion to control H5N1, all reasonable measures must be considered in connection with the cost implications. The welfare impact maybe highly problematic however the economic impact is of equal interest and therefore policies need to be based upon risk assessment, understanding the impact to all sectors. The cost of doing nothing is the worst case scenario; however the policy of culling all infected produce, without a compensation package can also be devastating for many farmers that rely on poultry as an income source.

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Climate Change in Moghan Plain

A.Nasseri
Islamic Azad University

S. Latifi-Mamaghan
Islamic Azad University

F. Pourabbas
Islamic Azad University

Climate change is one of the main challenges in agro-meteorological researches. In recent years, high temperature and moisture stresses caused a reduction in crop yield at some regions of Iran. In present study the climate change of Moghan plain located at the north-west of Iran was investigated using the meteorological data from 1986 to 2000. Results showed that annual total precipitation and average temperature were as 258.9 mm and 14.99 °C, respectively. The minimum and maximum temperatures were occurred in January and July and high variation was for February. From a year to year, the minimum, mean and maximum temperature varied slightly. Total precipitation was increasing in months of a year. The high variation belonged to October with trend slope of 2.95 and indicating an increasing about 3 mm to the annually total precipitation. The maximum and minimum of precipitation occurred for autumn and spring seasons and were as 81.83 and 40.59 mm, respectively.

Introduction

Climate change and global warming is one of the basic challenges of agro-meteorological research. Climate has always changed during the history. But its changes were completely perceived after industrial revolution in the latter half of the 1700s and fossil fuel use, consequently, increasing concentration of CO_2 in the atmosphere. Concentrating greenhouse gases is the main reason of increasing air temperature. Approximately, the air temperature will increased 3°C ,if the concentration of greenhouse gases raise up to two times of pre-industrialization ones. Increasing AT up to 1 to 2°C with 10% reduces in precipitation can be decrease 40 to 70% in runoff quantities. Consequently, decrease in rainfall causes confrontation of wide area of agricultural lands with water deficit, overthrow of many plants species, limitation of extension and quality in civil living, confrontation of environment with serious damages. Due to rising AT the crop evapotranspiration, water requirements for irrigated crops will accordingly increase. Then, it is necessary irrigation practices should be extended over agricultural lands, for compensating augmentation in evaporation results from warmer air. Therefore, a great expenses about 250 milliard $ is essential for using 5% of rainfall water for irrigation over the world. The following cases originated from increase in AT: (a) The precipitation is often as rainfall in the winter, (b) the rivers flows decrease in the summer, with snow-melting at the beginning of the year, (c) the seasonal precipitation and marine storms increasingly occur, and (d) the marines water levels will rise due to oceans warming and polar ice-melting. Climate changes affect agriculture and irrigation. The estimating water requirements of crops, designing canals capacities; irrigation systems; and hydraulic structures are based on meteorological data analysis. Evidently, changes in climate factors can be affect efficiencies of designed and constructed systems. A sample of weather incidents in the last decades are presented as follow: The years 1995 and 1997 were already very warm years on the meteorological record. On 15 Dec. 1986 and 10 Jan. 1993 all time pressure lows on the North Atlantic of 916 mbar were recorded in the surrounding area of Iceland. On Dec. 27th 2001 a typhoon crossed slightly North of Singapore that trees were leveled. Samples of climate events in Iran's agriculture in the recent years are as; Because of rain falling, sugar-beet planting was delayed till the end of June 1991 in Khorasan. Also, cutting rainfall at the end of Mar. 1994 Caused a considerable deficit in irrigation water as well air warming in the spring caused a decrease in pollination and yield of wheat. The moisture and thermal stresses caused reduce in crop yield in Gorgan.

Sevikumar (1992) reported that average precipitation considerably changed since 1960 in Niger, and were often blow normal quantities. Cutforth et la. (1999) showed that since 1950 the max. and min. temperature increased at the end of the winter and beginning of the spring in the Saskatchewan. Gorbani and Soltani (2002) showed that precipitation annually reduced as 4.3 mm but the max and min temperature were without variation during a 40 years period. The Moghan plain which located in the north-west of Iran is one of the important regions for agriculture. Changes in climate factors such as AT and precipitation can affect irrigated and rain-fed lands production in this plain. The rainfall regime in Moghan plain is Mediterranean. Average precipitation and relative humidity are as 260mm and 71.8 %, respectively. Therefore, the present study was made with aim of investigation of climate changes in Moghan plain for identifying and analyzing changes directions.

Materials and Methods

The air temperature and precipitation data analyzed for meteorological station of Parsabad-e-Moghan located at the north-west of Iran (latitude 39º 39´ N, longitude 47° 55´ E, and 31.9 m above mean sea level) in this study. Analyze and compare periods were 1984-2000 and 1961-1981, respectively. Because of effectiveness of AT and precipitation on climate changes, the following factors selected for study; (a) daily mean AT (°C) ,(b) daily max AT (°C), (c) daily min. AT (°C), (d) days sum having temperature more than 35°C (DT>35), (e) annual precipitation (mm), (f) days sum having precipitation more than 1mm (P>1), (g) days sum having precipitation more than 5mm

(P>5) and (h) days sum having precipitation more than 10mm (P>10). The variations of above factors during months and years using linear regression were investigated.

Results and Discussion
Air Temperature Data Analysis

Annual AT during 1984-2000 period averaged as 14.99°C and varied as coefficient of 6.25%. The min. and max. AT belonged to Jan. and July and were as 3.37 and 27.52°C, respectively. The highest variations of AT was for Feb. (Table 1).

Table1 – Mean air temperature and its coefficients of variations for months of year.

Months	Mean AT (°C)	Coefficient of Variations (%)
Jan.	3.37	29.48
Feb.	4.09	40.89
Mar.	7.57	22.43
Apr.	14.30	11.27
May	19.38	7.23
Jun.	24.81	7.58
July	27.52	5.12
Aug	26.88	4.79
Sep.	22.09	6.45
Oct.	15.45	8.37
Nov.	9.19	18.07
Dec.	4.76	33.36
Annual	14.99	6.25

Table 2 shows slope and correlation coefficient of variations trends for mean, min. max AT and DT>30. Results present that mean AT slightly changed (slope= -0.024 and r =0.124) year by year (from 1984 to 2000). There was found no changes in slope of trends for months of years excluding Sep. (slope= -0.129 and r =0.458*). Also, min. AT somewhat changed (slope= 0.0048 and r =0.058) year by year. The highest and least changes were for Mar. (slope=0.248) and Sep. (slope=0.006). Annually, max. AT slightly changed (slope= 0.090 and r =0.505).The highest and least increasingly changes were for Feb. (slope=0.231) and Jan. (slope=0.003). About 2.3, 2.0 and 1.4°C are augmented to max. AT of Feb., Dec. and Aug. every ten years. There wasn't statistically found changes between months or years for DT>35. The mean AT from the 1984-2000 were compared with 1961-1981 periods by paired t-statistics. There was statistically found no difference between mean AT form two periods. Mean temperature for months during two periods was presented in Figure 1. The mean AT for 1961-1981 and 1984-2000 periods obtained as 14.71 and 14.95°C, respectively.

Precipitation Data Analysis

There is annual precipitation was obtained as 258.9 mm with coefficient of variation of 19.22%. Its min. and max. respectively were as 319.7 and 153 mm and for 1996 and 1991. The max. and min. precipitation respectively were obtained for the fall (81.835 mm) and summer (40.594 mm). Also, the spring and winter precipitations were as 77.721 and 63.956 mm. Table 3 shows that the max. and min. precipitation were for months of Oct. and July with 36.259 (as 14% annual precipitation with CV=88.2%) and 7.264 mm (as 2.8% annual precipitation with CV=143.97%) that present a major changes of precipitations in two months. Table 4 presents that annual precipitation had a slight changes year by year but increasingly changes for months. The highest variation was for Oct. (slope=2.949*) that annually adds 3 mm to the precipitation.

Annually increasing for Mar. May and Nov. were as 2.7(r=0.56), 2.4(r=0.94) and 2 mm(r=0.73), respectively. The lowest escalating belonged to July with annual increment of 0.55 mm (r=0.44). Consequently, it seems an increasingly changes in precipitation during crop growing season, caused an escalating in crop yield. Therefore, it is recommended that planting date in rain-fed lands should be determined considering of precipitation changes trends.
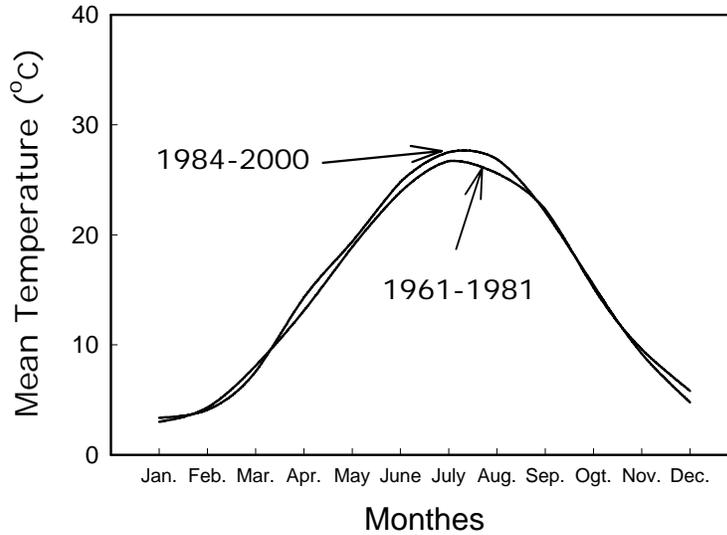

Figure1. Mean temperature for months during 1961-1981 and 1984-2000.

Table3 – Mean precipitation and its coefficients of variations for months of year.

Months	Mean Precipitation (mm)	Coefficient of Variations (%)	% relative to annual
Jan.	15.912	83.013	6.15
Feb.	19.344	56.058	7.47
Mar.	28.700	69.249	11.08
Apr.	24.562	96.719	9.48
May	34.576	76.747	13.35
Jun.	18.582	83.858	7.18
July	7.264	143.970	2.80
Aug	8.541	128.379	3.30
Sep.	24.788	166.667	9.58
Oct.	36.259	88.176	14.00
Nov.	25.629	84.315	8.98
Dec.	19.947	92.598	7.70
Annual	258.9	19.224	1.00

Table 2. Monthly variation of air temperature for Moghan climate condition.

Months	Min AT		Mean AT		Max. AT		DT>35	
	Slope	r	Slope	r	Slope	r	Slope	r
Jan.	-0.038	0.515^{*}	0.0025	0.01^{ns}	0.003	0.011^{ns}	0.00	-
Feb.	-0.041	0.205^{ns}	0.027	0.078^{ns}	0.231	0.517^{*}	0.00	-
Mar.	0.248	0.775^{**}	0.045	0.126^{ns}	0.161	0.381^{ns}	0.00	-
Apr.	0.092	0.379^{**}	0.021	0.061^{ns}	0.169	0.364^{ns}	0.055	0.231^{ns}
May	0.109	0.577^{*}	-0.045	0.162^{ns}	0.056	0.170^{ns}	0.296	0.410^{ns}
Jun.	0.004	0.021^{ns}	-0.084	0.226^{ns}	0.012	0.038^{ns}	-0.051	0.043^{ns}
July	0.026	0.188^{ns}	-0.036	0.129^{ns}	0.065	0.242^{ns}	0.110	0.22^{ns}
Aug.	0.155	0.694^{**}	0.047	0.185^{ns}	0.140	0.529^{*}	0.188	0.288^{ns}
Sep.	0.006	0.037^{ns}	-0.129	0.458^{*}	-0.099	0.310^{ns}	-0.247	0.276^{ns}
Oct.	0.045	0.192^{ns}	0.019	0.076^{ns}	0.119	0.306^{ns}	0.039	0.288^{ns}
Nov.	-0.050	0.199^{ns}	-0.059	0.181^{ns}	0.065	0.144^{ns}	0.00	-
Dec.	0.149	0.510^{*}	0.099	0.317^{ns}	0.207	0.563^{*}	0.00	-
Annual	0.0048	0.058^{ns}	-0.024	0.124^{ns}	0.090	0.505^{*}	0.141	0.055^{ns}

Results revealed that days sum having precipitation more than 1mm (DP>1) didn't change year by year. The DP>1 increasingly changed for months. The highest changes were for May (slope=0.46**) that about one day is increased to mentioned days sum during two years (Table 4). Annually increasing for Mar., Oct. and Feb. were nearly identical. There are about two days were increased to DP>1 in mentioned months during five years as well as during two years only one days were increased to DP>1 in Jan. There are found no changes in Apr. June and Dec. (Table 4). Results showed that days sum having precipitation more than 5mm (DP>5) didn't change year by year. The DP>5 increasingly changed for months. The

Table 4. Monthly variation of precipitation for Moghan climate condition.

Months	Annual precipitation	DP>1			DP>5			DP>10	
	Slope	r	Slope	r		Slope	r	Slope	r
Jan.	1.556	0.404^{*}	0.348	0.62^{*}	0.061	0.196^{ns}	0.000	0.000^{ns}	
Feb.	1.717	0.945^{**}	0.406	0.91^{**}	0.107	0.498^{*}	0.027	0.378^{ns}	
Mar.	2.749	0.563^{*}	0.418	0.93^{**}	0.189	0.389^{ns}	0.045	0.027^{ns}	
Apr.	1.887	0.715^{**}	-0.139	0.33^{ns}	0.115	0.858^{**}	0.050	0.549^{*}	
May	2.417	0.937^{**}	0.463	0.93^{**}	0.177	0.999^{**}	0.047	0.763^{**}	
Jun.	1.584	0.597^{*}	0.179	0.29^{ns}	0.121	0.490^{*}	0.037	0.460^{ns}	
July	0.556	0.444^{ns}	0.076	0.68^{*}	0.029	0.400^{ns}	0.022	0.334^{ns}	
Aug.	0.706	0.426^{ns}	0.102	0.56^{*}	0.037	0.400^{ns}	0.015	0.417^{ns}	
Sep.	2.316	0.283^{ns}	0.188	0.41^{ns}	0.128	0.338^{ns}	0.079	0.320^{ns}	
Oct.	2.949	0.646^{*}	0.412	0.89^{**}	0.212	0.541^{*}	0.082	0.420^{ns}	
Nov.	2.003	0.730^{**}	0.353	0.95^{**}	0.135	0.616^{*}	0.046	0.408^{ns}	
Dec.	1.477	0.725^{**}	-0.132	0.26^{ns}	0.081	0.83^{**}	0.027	0.389^{ns}	
Annual	0.506	0.023^{ns}	-0.051	0.032^{ns}	-0.142	0.145^{ns}	-0.011	0.333^{ns}	

highest changes were for Oct. (slope=0.212*) that about one day is increased to days sum during five years (Table 4). The DP>5 changed annually having slope of 0.177 for May. There are no changes in DP>5 for Jan., Mar., Jul., Aug. and Dec. months. The days sum having precipitation more than 10mm (DP>10) didn't change for months and years (Table 4).

The return periods for precipitation occurrence were estimated based on 1984-2000 data. It is expected a precipitation will occur as 267,293,303 and 319 mm or more than   for 1,2,3 and 12 years, respectively (Figure 2).
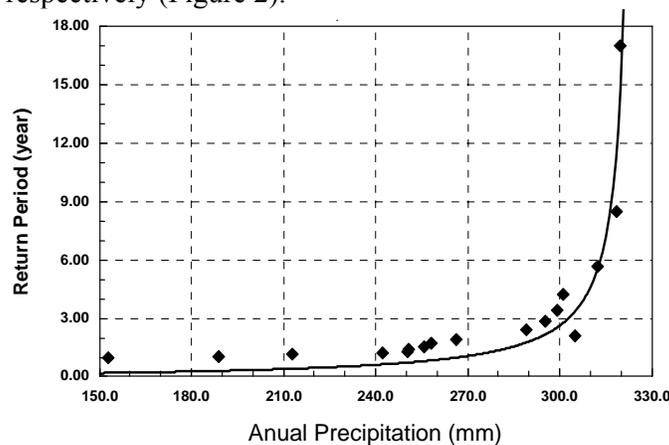

Figure 2 . Annual precipitations versus return periods estimated based on 1984-2000 data.

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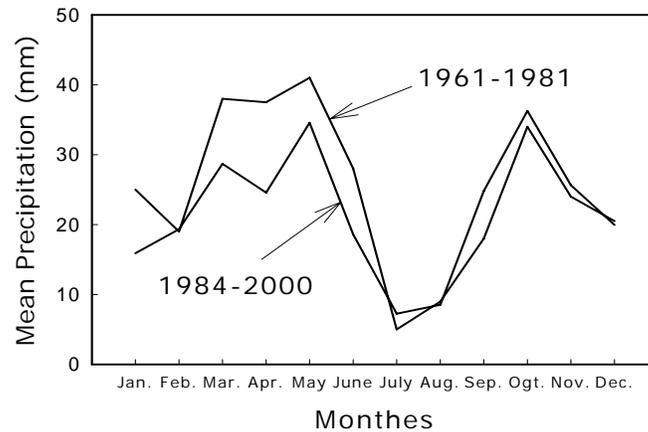
Figure 3. Mean precipitation versus months for 1961-1981 and 1984-2000 periods.

The mean precipitation from 1961-1981 compared with ones of 1984-2000 periods by using paired t-statistics that obtained as -1.62. There are found no difference between mean precipitations acquired from above-cited two periods (Figure 3). Annual precipitation for 1961-1981 and 1984-2000 periods obtained as 299 and 264.1 mm, respectively.

Conclusion

Air temperature and precipitation data during 1984 - 2000 period from meteorological station of Parsabad were analyzed and compared with data during 1961-1981 period. There was found no changes in minimum, mean and maximum temperature as well as DT>35, annual precipitation, DP>1, DP>5 and DP>10, year by year. The min., mean and max. temperatures were as 3.37, 14.99 and 27.52°C, respectively. The mean temperature changed in Dec. and Sep. About 2.3, 2.0 and 1.4°C are increased in max. temperature of Feb., Dec. and Aug. every ten years. There was found no statistically difference between mean AT form two periods of 1984 - 2000 and 1961-1981. Annual precipitations for the first and second periods were 299 and 258.9 mm, respectively. The max. and min. precipitation belonged to Oct. and July which were as 36.259 and 7.264 mm. The max. and min. precipitations were occurred in the fall and summer that were 81.835 and 40.594mm, respectively. In general, precipitation changed as increase in months year by year. The max. change was for Oct. which about 3 mm is increased to precipitation during one year. The min. change was for July. Consequently, it seems the increasingly changes in precipitation during crop growing season, caused an increasing in crop yield. Therefore, it is recommended that planting date in rain-fed lands should be determined with considering of changes trends of precipitation occurrence. The DP>1 increasingly changed for months. The highly changes was for May that about one day is increased during two years to mentioned days sum. During five years about two days were increased to DP>1 in March (Mar.), Oct. and Feb. as well as during ten years abut five days were increased to DP>1 in Jan. There are found no changes in foregoing days sum in Apr. June and Dec. An increasingly changes were found in days sum having precipitation more than 5 mm in months year by year. The highly changes were for Oct. that for every five years, one day was increased to mentioned days sum. The return period for precipitation occurrence was estimated. It is expected a precipitation will occur as 267 and 319 mm or more than   for 1 and 12 years, respectively. There are found no difference between mean precipitations acquired from two periods of 1961-1981and 1984-2000.

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Natural Resources

Transforming the Problems into Opportunities in Energy Sector

Zeynep Ökten
Mustafa Kemal University

Şenol Adıgüzel
Mustafa Kemal University

For energy experts the oil sources in the world except from Middle East end Khazar zone will be exhausted in the next 15 years. In this situation being dependent to outside by oil means that political,economical and ecological problems which focuses on energy'll be the determinative component for world's future.

Most of the countries are looking out new ways for renewable energy sources like solar, geothermal, hydrogen, heave, biodiesel, wind energy. Between these alternatives wind energy and biodiesel are the most promising ones.The process of the energy problems and transforming them into oppotunities is valid for Turkey too.

The aim of the study is to show the the problems due to the heavy usage of fossil fuel, and try to find out how these problems can be transformed into oppurtunities while using renewable energy sources general for world in special for Turkey.

Introduction

The evoluation of the society has been mostly depended on quality of the energy sources which they used or enlarged .Energy sources 'll also be forcefull for the societies future . In addition to the several economic indicators, the ratio of per capita energy use has been used for several decades as a socioeconomic development indicator.

While the energy demand is continuously increasing it is known that the sources can't not be found indifinitly. Scantiness of energy supply causes serious fearness . Both developed and developing countries need energy sources with differant reasons. USA is the biggest global economic power and needs more energy sources to remain being a world leader. But USA couldn't developed new renewable energy sources and this caused to them being dependent to outside especially to Middle East at a hıgh level like %60. Chiana and Indian are the golden stars of future and with their huge population and fastly growing economies they'll bebetween the biggest demanders for energy. Beside USA, the dependence to oil of Chiana's and Indian's are giving the signals that world is going to have serious energy problems.

Nevertheless, there is great potantials transforming the problems into opportunities. At this point renewable energy sources are very important occasion for especially development of rural areas. Biodiesel or wind energy has potantial to be a catalyzer to the development of rural.

Most of the countries are making plans about to subsitute their ten percent of electric necesity by wind energy. Additionally they are looking out new ways for renewable energy sources like solar, geothermal, hydrogen, heave, biodiesel. Between these alternatives wind energy and biodiesel are the most promising ones. For this reason, countries encourages programs and provide inducements to improve wind energy and biodiesel technology.

The process of the energy problems and transforming them into oppotunities is valid for Turkey too. Dependence for energy to outside is an important issue, although Turkey is too late for beginning to research the renewable energy sources she has more advantages than most other countries. Turkey has great potential for wind and heave energy and has got wide agricultural areas and appropriate climate for farming kanola, sunflawer, cotton exc. which are the raw materials for producing biodiesel.

The Problems in Energy Sector
Economic Dimension of Energy Problems

The relationship between energy consumption and income has been a popular issue of debate in economic development and the environment, yet a consensus has been lacking regarding the permanent as well as transitional relationship.

To date, the causality may run in either direction[1]. The results of a unidirectional long-run causal relationship and a uni-directional short-run causal relationship running from energy to GDP show that energy consumption leads economic growth. This implies that energy consumption bears the burden of the short-run adjustments to reestablish the long-run

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[1] For example, if there exists causality running from energy consumption to income, then this denotes an energy-dependent economy such that energy is an impetus for income, implying that a shortage of energy may negatively affect income (Masih and Masih, 1998). On the other hand, if there is a reverse chain of causality from income to energy, then this denotes a less energy-dependent economy such that energy conservation policies may be implemented with little adverse or no effects on income (Jumbe, 2004). Finally, the finding of no causality in either direction, the so-called neutrality hypothesis (Yu and Choi, 1985), means that energy conservation policies do not affect income

equilibrium. In other words, high energy consumption tends to have high economic growth, but not the reverse. But it is also known that the oil sources in the world except from Middle East end Khazar zone will be exhausted in the next 15 years*(Yetkin, 2006)*. Knowing this truth urge countries energy conservation but energy conservation may harm economic growth in developing countries regardless of it being transitory or permanent.(Lee,2005).

Another problem is the unstable oil prices. Oil prices have been more volatile than prices of most other commodities since the oil crisis in 1973 (Fleming and Ostdiek, 1999; Verleger, 1993). This assumption has been used to justify price and allocation controls and energy efficiency subsidies and recently has been the basis for recommendations for national energy policy to diversify energy sources away from oil (Awerbuch, 2003; Humphreys and McClain,1998; Lovins et al., 2004,Regnier,2005)).

Because of the scarsity and the rising prices it is guessing that production of the fossil fuel'll drop very low levels at the end of 21 century. But it is forecasting that world have enough reserves for natural gas more than 200 years and for coal 3000 years (.Ministry of Environmental,1997). Nevertheless coal's contribution to air pollution is so high that coal is seen like" the creator of the problems of environmental". At this context there is essential economic causes for the process of transforming from fosil fuels to non-fossil energy sources but during this process there is also possible costs. Of course developed countries has more chance to compensate these costs than developing countries. But the bigger problem is the deficiency of willpower of the global economy countries like USA than the transformation cost problem.There are two reflections of transforming from fossil fuels to non-fossil energy sources,which we call transformation problem, at the developing countries the problem can be seen like transforming costs but at the developed countries it can be seen like deficiency of willpower.

While developing countries like China, Indian, Brazil, Mexiko, Turkey are using their economic sources they firstfully have to think about the output maximization and cost mimimization environmental worries cames later. For these countries the problem is to get a bigger slice from the global pie so they have to minimize the costs to have competitive prices an extra cost like energy transforming invesments removes them from target prices.

When we look from developed countries perspective economic cost of energy is in a different structure. USA's " dependence of import fossil oil" was %30 at 1973 when there was a global fossil oil crise but this ratio increased and at 2005 to %60, also the prices fossil oil per barrel nowadays climed to 70$ from 18$ before 11 September 2000(Yetkin,2006). For Europe same progress can be investigated " dependence of import fossil oil" for Europe is %50 but it is forecasting to be %70 in next 20-30 years.

The solution can be found at renewable energies. Renewable energies are essential contributors to the energy supply portfolio as they contribute to world energy supply reducing dependency of fossil fuel resources'll reduce and greenhouse gases mitigating opportunities will be provided.

The pie chart below represents the main fuels in the world total primary energy supply, with a disaggregation of the share of the main renewables categories. In 2003, renewables accounted for 13.3% of the 10 579 Mtoe of World Total Primary Energy Supply (TPES). Combustible renewables and waste (97% of which is biomass, both commercial and non-commercial) represented almost 80% of total renewables followed by hydro 16.2%).

2003 Fuel Shares of World Total Primary Energy Supply*
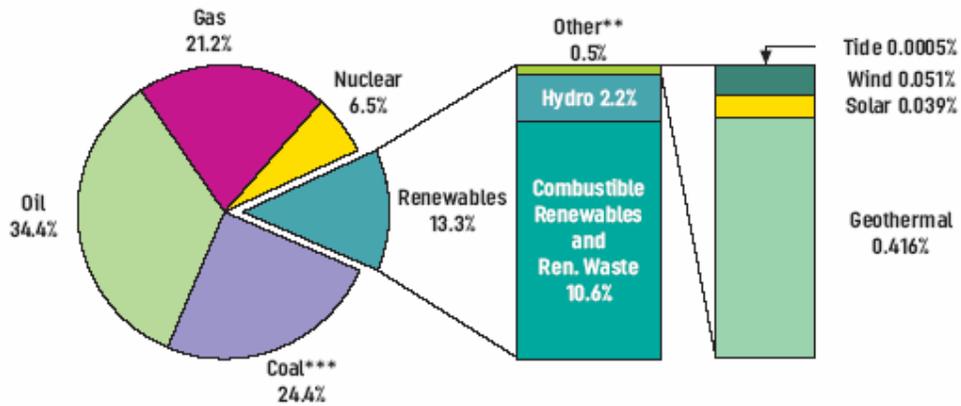
* TPES is calculated using the IEA conventions (physical energy content methodology). It includesinternational marine bunkers and excludes electricity/heat trade. The figures include bothcommercial and non-commercial energy.
** Geothermal, solar, wind, tide/wave/ocean.
*** Includes non-renewable waste.
Source: IEA,Renewables İn Global Energy Sıpply2006,,www.iea.org

Annual Growth of Renewables Supply from 1971 to 2003
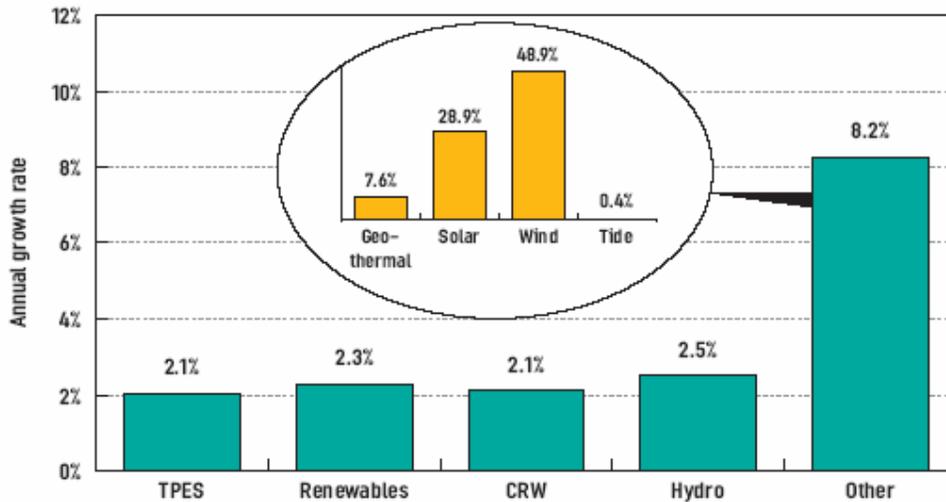
Source: *IEA,Renewables İn Global Energy Sıpply2006,,www.iea.org*

Total renewables supply experienced an annual growth of 2.3% over the last 33 years, marginally higher than the annual growth in TPES. However, the "other" category in the chart above (also referred to as "new" renewables and including geothermal, solar, wind, etc.) recorded a much higher annual growth of 8%. Due to a very low base in 1971 and to recent fast growing development, wind experienced the highest increase (+49% p.a.) followed by solar (+29% p.a.)[2].

Looking at Turkey's energy sector same problems can be seen. *Turkey's energy production is 23,63 Mtoe, net impports is 56,57 Mtoe TPES* is made up of indigenous

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production + imports - exports - international marine bunkers ± stock changes)is 78,95 Mtoe(Key World Energy Statistics,,2005) This datas shows that Turkey gets %72 of it's energy needs from outside and it is claiming that if there will be no guard this dependency will rise to%82 in 2020. %95 of imports are fossil oil from Middle East and nature gas from Russia and Iran. This dependency makes fragility on Turkey's economy because of the changing prices and difficulties in procurement. İndeed energy imports is the main reason of the current deficit, which is the biggest problem of Turkısh economy. For example, the share of energy import in payments for total Turkish import is around 15–20%, 25–30% in industry sector and 75–80% in the mining sector (UTFT, 2004).

Ministry of Environmental has announced a target for wind energy of%2 of total installed capacity by 2005. There are no other national renewables targets, although greater Ankara Municipality has a local target of providing 10% of its energy needs from renewables(mainly solar heat, PV and wind generated electricity) by 2005. However many developed countries like USA encourage investments for renewable energy such as wind power, solar energy and biomass energy. State support policies are generally based on various incentive tools concerning production of solar heat collectors, wind turbines and energy crops. The EU and many developed countries' state support policies are generally focused on some fiscal and tax regulations for investments, renewable energy domestic consumption prices, new Technologies for obtaining energy from renewable sources and research-development studies (Durak and Caldag, 2003; Reiche and Bechberger, 2004; Upreti and Horst, 2004; Kwant, 2003;Sayın et al,2005).

Ecological Dimension of Energy Problem

Through the historical aspect, the 20th century was the century of fossil fuels. Especially, at the very beginning of the 20th century,coal, as an important kind offossil oil ,took its place by petroleum with the rapid increase of the automobiles.The excessive consume of fossil (qualified)coal and petroleum introduced significant environmental problems.

Towards the end of the 20th century,the pollution in the cities ,the effect of the greenhouses and the global climate changes resulted in new researches. In this case, towards the end of the century,natural gas replaced coal. (Brown,2003:100)As soon as the global dimonsioned environmental problems started threatening the civilazation creat by the mankind, new researhes were inclined to the understanding came out as a newexpression of the balance among the economy,society and the environment(Keleş,Hamamcı,2002:,65). Though the concept of the progressive development came intosight before the quarter century, the totalitarian strategies in global dimensions, unfortunately, have not been made real. So as to keep the development progressive, is firstly about the capacity of the renewal of the natural resources. The progressive development is stopped up about the energy. Due to the fact that the fossil (qualified)energy sources will be used up in the near future; however,there is no way to provide the recycling about the alternative energy sources that might possibly be substituted and the expence of this recycling process are the most significant handicaps of the progressive development.

As a significant step on the progressive development, the necessity of recycling of energy was firstly introduced in 1990s. The global environment problems rooted from the fossil fuel sources have given a speed for the enterprises to provide recycling in energy. After the United Nations Environment and Development seminar firstly held in 1992 in Rio de Janerio,in Brazil,the issue of the precautions to prevent global warming have become an important matter. Moreover, to the Kyoto Agreement signed in 1997, the global target has

been determined to diminish the emmision values of carbon, from 2008 to 2012.The target ratio is %5.2 according to 1990. Nevertheless,it seems impossible to reach that the EU (Europen Union) would not be able to diminish the %8 emmision decrease.It is likely to happen the same for the increase over %5.3 in the period assigned.Till now ,all over the world ,according to 1990, while the emmision is %9, this ratio ıs 18 percent in USA (Özerdem,2003). As it is seen contrary to the expectations, an increase is observed instead of decrease in the emissons.

Due to the limited enegy sources with fossil quality and the global environment problems they caused, the renewable energy sources are paid too much attention with a gradually increasing manner and they are considered as important sources in responding the energy necessity. With this respect, too many countries are planning to meet %10 of their requirement for electric energy from renewable energy sources in 2010.

Among renewable energy sources like wind, solar, jeothermal, biomass and wave ,the most encouraging renewable source from the point of view electric production is the wind energy.The wind as a clean and nonproblematic energy source has existed an important agenda as a more reasonable choice day by day. On the positive side, no direct atmospheric emissions are released during the operation of wind turbines. The emissions during the production, transport and decommissioning of a wind turbine depend mainly on the type of primary energy used to produce the steel, copper, aluminium, plastics, etc. used to construct the turbine. The energy payback time is comparatively short – usually only three to six months. Electricity from wind turbines has very low external or social costs.

Some negative impacts also need to be addressed. Acoustic emissions from wind turbines have both a mechanical and an aero-acoustic component, both of which are a function of wind speed. Reducing noise originating from mechanical components is a straightforward engineering exercise, whereas reducing aeroacoustic noise is a rather difficult process of trial-and-error. In modern wind turbines, mechanical noise rarely causes problems. The acoustic-source noise from wind turbines needs attention because it is one of the main obstacles to siting wind turbines close to inhabited areas. The turbines' visual impact also limits social acceptance. Wind turbines may disturb the habits of birds and other animals, mainly in coastal breeding and resting sites close to migration routes(OECD,2003).

However, wind is sensitive to variations in terrain topography and weather patterns, and variation may occur from year to year, or season to season, and even during the same day. Hence, some regions are more suitable for the utilization of wind energy. The highest potential for exploitation is in North America, Ukraine, Australia, Denmark, the Netherlands, the north of Gibraltar, Southern France, the United Kingdom, Ireland, Scotland, Greece, Spain and Turkey (Borhan, 1998; Ackermann and Söder, 2000).

In 2003, Germany has become a leader assembling a power station of 14.646 MW overcoming Spain with 6.207 MW upto that date. And Denmark which is the world's most important country in producing turbine, has become the third with 3.24 MW after Germany and Spain. However, Turkey owns an electric energy with totally 20 MW.It is useful to draw attention to the vast usage of this clean energy source in a developed country like Germany. In Europe, not any commercial wind power has exsited until recently.The wind power is competing with fossil and nuclear ower beginning from now even without taking into consideration the enviromental produced from the wind meets %2 of the requirement in Europe. When the whole world is considered ,this proportion is only %0.4 (Özerdem,2003). When it is specified,especially in Europe, the renewable energy sources especially wind energy is commonly accepted and this approach has become prior:In energy policy,convincing the capital group and giving a pioneer role to the interference of the capital group in developed projects. While this period works out successfully in Europe,it is

impossible to say the same thing for USA process on this subject show that USA will have difficulty and it hasn't got a real transformation strategy. The plan 'Twenty Years Of America's Energy Economy" published in May,2001 was a great dissappointment. The plan resembled the report prepared in the 20th century, not in the 21st century and it is focused to increased the production of fossil fuels. The report also disregarded the wind power potential which will exist a more important part than coal in the USA energy capacity in twenty years.In the world coal consumption, even China's usage of coal, the rival of America has decreased %14 in 1996. It is surprising that this problem has been neglected by those who have prepared the plans.(Brown,2003-99)Yet this table is highly remarkable at showing the rank of USA in providing energy transformation. As it is seen what comes up in today's world,especially the things happening in USA are really at an alarming level because of the changes in climate that have come up after the global warning. Inspite of waste of time ,some studies have been taken in Turkey too about gettng into the renewable energy by giving up those kinds of fossil fuels. Air pollution especially in big cities has been partly reduced by preferring to use gas instead of using coal.Yet it caused us to be more dependent on the other countries to meet the need of energy.

International Dimension of Energy Problem

USA consumes %25 of the total world production of fossil fuel by alone also Europe and Eurasias consumption share is %25 from total production(BP Statistics,2004)Americans lead the world in fossil energy use. An average American consumes about 11,000l of gasoline energy-equivalents each year (USCB, 2004). Because of this high-fossil energy use, plus the lack of adequate domestic sources, the U.S. now imports 62% of its oil. Given the population expansion, the importation of oil will have to increase. Fossil fuels are finite energy resources! Reliable projections are that oil and natural gas reserves of the world will last another 40 years (Salameh, 2005). USA coal is expected to last 50 to 100 years, depending on how fast it is substituted for oil and gas.If there is high dependence ratıos for the essential ınput like energy at developed countries it is not diffucult to guess that there will be a great risk for the world safety in the future

Middle East and Khazar area will have a monopol power at fosil oil in future in the first instance USA and Europe following the other countries are going to be dependent to the despotic rejimes of Middle East. Lack at the transforming to renewable energy sources will cause to lack of the success for both USA and Europe who tries to export democracy to Middle East with the extent of Great Middle East Project have felt that USA's Great Middle East Project bears such a hidden agenda and they will confront and hamper at commercial and politic relations with USA and EU also they have already started trying to gain China's support. This process will bring along the appearance of a vicious cycle. While on the one hand USA and the continental Europe are increasingly become dependent on the Middle East as far as Oil exports are concerned, USA on the other hand, will not hesitate to directly interfere with the region in order to have a smooth, problem free access to the region's energy resources. In the context of this interference, USA herself will permanently settle in the region, and this will give rise to doubt among the despotic regimes, as well as causing the radical elements become harsher and tougher. These developments will bring about a management problem as far as the energy resources of the area are concerned and cause oil prices to increase even more rapidly.

Transformıng the Problems into Opportunıtıes
Moving Towards Renewable Energy Sources for Economic Development

Moving from fosil oil to renewable energy sources improves the geopolitical energy security In reality, if geopolitical risks are reduced, this should reduce price volatility of that fuel,(Blyth, Lefèvre,2004)so that national economies will be more stable. Obeying with the rules of Kyoto Aggrement the gas emission'll be reduced and the world'll be more livable. With the result of reducing the dependence of Middle East's fossil oil the world confusion about Middle East can be disappeared.

More livable world means less healty problems so that hıgh performance for labor force.On the other hand there will be new and more sectors for employment and hıgh profits.

EU already made plans about the renewable energy sources.EU Sustainable Energy Systems Research Programme aims to:reduce pollution and greenhouse gas emissions;increase security of energy supply;improve energy efficiency and the use of renewable energy;enhance the competitiveness of European industry;improve the quality of life.(Justus, Philibert, 2005);till 2015 rise the consumption level %15 at renewable energy sources and %8 at biodissel,till 2020 rising the energy saving level %20. EU Commision have a high opinion of R&D about renewable energy for example it is claiming that an invention about the hydrodgen energy'll be a revalutation(Kaleağası, 2006).

Moving Towards Renewable Energy Sources for Development of Rural

Moving from fosil oil to renewable energy sources can be used for the development at rural areas. At this content primarily inducements have to be given to the farmers to use wind energy. Revenue from wind energy keeps in the community so that it promotes local revenue, employment and tax revenue.For the farmers to investigate the wind energy is likegushing out fosil oil from the earth. The most attractive speciality of wind energy is tribuns are not an barrier to use the land for farming and stock-breeding. (Brown, 2003:108). So that beside the gains from farming and stock-breeding farmer can earn a special revenue from tribune of wind and public of the region gets more electric energy. By this meaning wind energy sector is a great hope for the development of rural especially in the developing countries.

Production of biodiesel have a great potantional for supporting rural development Soubean, sunflower and kanola are the inputs for biodiesel and giving encouragement to the farmers to produce these inputs give a new breath for the agricure sector.Thus clean and enviromental-lover fuel production will reduce the dependence to fossil oil and promote the rural development.

Moving Toward Renewable Energy Sources as a Solutional Instrument of The Ecological Problems

The civilization which is been created by humanbeing threatens the future especially from the begining of 20 century. Using intensive fosil energy sources causes local environmental problems but by time the problems has been seen at global size.Air pollution, greenhouse effect, acid rains in cities brings the climate alteration. For the solution of these problem obeying Kyoto Protocol at global dimension is very important because for global threat there has to be global solutions.But USA, who is the most responsible from the greenhouse effect, don't want to sign the protocol . The UNFCCC and its Kyoto Protocol provide a framework for climate change mitigation actions for a number of countries in the developed and developing world. It would be unfair to say that developing countries are not taking steps to develope climate friendly technologies. Many countries have defined such measures, although in most cases for other policy purposes - such as to reduce imports of

fossil fuels from sensitive regions or to reduce air pollution associated with the burning of coal. China, for example, has recently enacted a Renewable Energy Law. It is also part of a number of international cooperation programmes to develop other climate-friendly technologies such as CO_2 capture and storage. India is probably the only country in the world to have a ministry dedicated to the promotion of non-conventional energy sources. Nevertheless, the vast majority of efforts to develop modern alternatives to fossil fuels are concentrated in OECD countries (Lefevre,2005)

The Energy Problems and Oppurtunities of Turkey

At present, Turkey struggles to reach sufficient levels of energy supply, and depends on other countries for certain types of energy like electricity. So as to cope with the increasing demand, electricity is imported from neighboring countries to some extent by causing depletion of already strict foreign exchange reserves. Another equally important issue lies in the country's dependency: As the country is located in a politically "soft" region, therefore, importing electricity from foreign sources may substantially affect the conditions that sometimes may bring instability on the overall energy strategy(Karata,Ekmekçi,2002).

Turkey has great potential and different combinations for renewable energy sources owing to the presence of different geographic regions. The share of energy from renewable sources in total energy production and consumption in Turkey are around 35% and 13–15%, respectively. This potential provides important advantages for Turkey, particularly in the long term. The renewable energy potential of Turkey consists of 122.3 TWh/year of hydropower, 1.8 mtoe/year of geothermal power, 50 TWh/year of wind power, 32 mtoe/year of biomass and 35.2 mtoe/year of solar energy in usable and/or economic quantities (Kaygusuz, 2003; Sayın et al,2005).

When it is specified, Turkey has always been lucky with its potential of 'water'.But it is assumed that we are able to make good use of only %25 of this potential. It is also known that we don't take serious steps about energy disposal and productivity and are lack of working seriously on it in Turkey. Scientific researches show that there is the potential of energy disposal upto %30 in Turkey but just %15 of it which doesn't need any expenditures,can be gained with planning and by making people conscious of. Along with it, according to the offical figures, the scale of leakage-lose in the electric distribution network is up to %20(Ulutaş,2006). Turkish state plans to build new hydro dams, the cost of which is estimated to reach to the level of USD 30 billion for the next 10 years. Although hydropower does not pollute as much as fossil fuels do, , inhabitants who are within the construction field are affected substantially. Recently built Birecik dam has covered a large area, and forced inhabitants to leave their agricultural plants. Another negative impact has been observed over the historical monument named as Zeugma, so called the "Second Pompei". The dam water has covered most of the mosaic art(Karata,Ekmekçi,2002).

Solar energy is one of the avaliable and cheap source for Turkey. The average solar radiation is 309.6 cal/m2 d and the average sunshine duration is 7.2 h/d. In particular, the southeast Anatolia and the Mediterranean regions are favorable for solar energy use. Generally, solar energy is used for heating and the consumption of solar energy has increased from 5 ktoe in 1986 to64 ktoe in 1996 [4]. Total geothermal potential of Turkey is 35,600 MW/ year (electric and thermal) and about 4500 MW/year can be used for generating electricity(Oğulata,2003)

For an alternative energy source nuclear energy has been discussing for a long time in Turkey by two opposite opinions. For the opinion which five support to nuclear energy the aim must be to diversify of the energy sources so that to distribute actual risk*(Münir, 2006)*. For the opposite opinion nuclear energy is not a kind of cheap energy source, the cost of

construction a nuclear santral with the capacity of 1500 megavatt is 5-7 billion Eur .and it can't be an urgent solution for energy need because it takes 15 years the construction of a nuclear santral(Ulutaş,2006). Furthermore there is huge costs from the construction to the closure so that most of developed countries like Germany and USA are planning to closure in a soon time. (Talınlı,2006). As we all know,the responsibility of the nuclear management should be transparent and explained clearly like we do for the other responsibilities.For instance ,during the daily operations of the nuclear powerhouses,there are gases and liquid radioactive throw-outs which have to be released to the atmosphere quite often.These throw-outs which prevent the reactor operations and are highly prized if they are kept in the reactor,are constantly inspected.In Turkey,it takes the goverments quite a long time to adopt such concepts and this may lead it to the dangerous results. Additionally the dependency of energy will not decline with using nuclear energy however it will increase because Turkey has only 600 ton uranium source.

Wind energy is the fastest growing energy source in the world and wind power is one of the most widely used alternative sources of energy today. It is a clean and renewable source of electricity. At the end of the year 2001, the total installed capacity of global wind energy exceeded 24,576 MW (Global wind power statistics.,2002) Approximately, 6500 MW of new wind energy generating capacity were installed worldwide in 2001. Today, wind energy projects across Europe produce enough electricity to meet the domestic needs of five million people (Wind energy in Europe. EWEA , 2002;Oğulata,2003). Theoretically, Turkey has 160 TW h a year of wind potential, which is about twice as much as the current electricity consumption of Turkey(Wind energy in Turkey.2002,Oğulata,2003). There are very limited developed projects of the wind energy in question.When it is specified,in Turkey,we have had three powerhouses which produced wind energy since 2000.Two of them are founded in İzmir, Alaçatı.These powerhouses produce 8.8 megawatt energy whereas the other powerhouse in Bozcaada is enable to produce 10.2 megawatt energy. Turkish population is widely spread to rural areas Wind and other renewable sources are very much appropriate for those who need electricity power living in isolated communities. Instead of spending in transmission lines from on-grid electricity sources, making an investment to wind plants, supported by solar power systems will be much beneficial, as these sources do not harm the environment(Karata,Ekmekçi,2002)

Conclusion

It is obvios that both developed and developing countries going to have an energy problem in the future. The problem will to occur in different dimensions like economic, international relations and ecological. The only solution is accomplishing the transition from fossil oil to non fossil oil energy sources.

Wind energy and biodiesel are the most hopeful renewable energy sources. USA and EU already began R&D in renewable energy sources, but the datas shows that the studies are not enough because for today renewable energy supply is only%13.3 of total World Primary Energy Supply. IEA has two scenario for the future; By the opinion of Reference Scenario of IEA, the share of renewables in global energy supply will remain largely unchanged at 14%. Traditional biomass currently accounts for 7% of world energy supply, but its share will fall as developing countries shift to modern forms of energy. World hydropower production will grow by 1.8% per year but its share will remain almost stable at around 2%. Other renewables (including geothermal, solar and wind) will increase most rapidly at 6.2% per year but because they start from a very low base (0.5% share in 2003) they will still be the smallest component of renewable energy in 2030 with a share of only 1.7% of global energy demand (WEO 2005).

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The largest increases in renewables will take place in OECD Europe, driven by strong government policies. Since over a quarter of new power-generating capacity will be based on renewable energy, the cost of development is expected to be $1.6 trillion (in year-2000 dollars), nearly 40% of power generation investment to 2030. The share of biofuels in global road transportation was 0.6% in 2003. This share is expected to grow to 1.4% by 2030. (WEO 2005)

In the Alternative Scenario, hydroelectric generation in 2030 is 15%, slightly higher than the 13% projected in the Reference Scenario. The share of nonhydro renewables increase much more, from an aggregate 6% in 2030 in the Reference Scenario to 9% in the Alternative Scenario. The biggest increase takes place in OECD Europe, driven by the European Union's strong support for renewables. Electricity generation using non-hydro renewables is almost ten times higher in 2030 in the Alternative Scenario than in 2003, and more than a third higher than in the Reference Scenario (WEO 2005)

Turkey is a developing country and its known that there is a relation from GNP growth to enery and so Turkey's need for energy'll increase in the future. Turkey has great potential and different combinations for renewable energy sources owing to the presence of different geographic regions Goverment has to give essential importance to the subject and has to promote at the base of institute and individual.

The Scenarios shows that energy of the future is not hopeful every country has to take the guard to get out of the depence of despotic regimes, to have a livable and safe world.

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Bargaining the Environment for Development: The Ewekoro Experience

Kola Subair
Lagos State University

Irrespective of the indicators used for measuring development, the probability of attaining higher rate of growth by industrialized nations is very high. This is because job opportunities are created and consequently have multiplier effect on economic development. It is therefore imperative that for development to take its cause in the third world countries, the transition to modern economy requires some degree of industrialization. In achieving this, these countries should concentrate on those industries that utilize more of their endowed resources as input. Where the resource use is not managed properly, the environment gets destroyed. Hence just as industrialization can spur economic development, it can also generate environmental problems.

Unfortunately and because of peculiar problems associated with land availability in Nigeria for instance, the same location harbours farm lands and industrial sites.

On this basis, the paper critically examines the impacts of industrial activities on agricultural productivity.

Using Ewekoro- a small and all rural community in the south- west Nigeria, the community accommodates a cement factory where farming is the major occupation of the residents. On this note, samples are drawn from the staff of the factory and the residents of Ewekoro in order to determine the degree of the community's development, extent of environmental change and their consequences on agricultural activities. Descriptive statistics and econometric technique shall be used to analyse the generated data.

Finally it is expected that if the factory does not have an adequate method of disposing its wastes, agricultural output will be affected.

Introduction

Going by the previous experiences of several economies, attainment of sustainable development is not without some degree of environmental degradation. Where there is no serious concern for the environment or serious measures for containing its problems, several problems like indiscriminate dumping of wastes, illegal mining and pollution are encouraged.

These are more prevalent in the least developed countries such that several times, untreated wastes are dumped into the environment. To worsen the situation industries are located haphazardly without due regard to physical planning policies.

As far as land ownership is concerned in the African settings land availability has remained inadequate to meet its demand. Hence, the same land that is used for farming is also used for industrial activities. This has continued to reduce agricultural productivity.

In the south-south Nigeria, agricultural activities have almost been paralysed due to oil spillages. For this reason, as long as the economy depends on oil as its major source of foreign exchange earnings, agricultural production keeps declining. The problem is not peculiar to south-south Nigeria alone, but also inevitable in the south east and south west Nigeria.

This is because for such an economy characterized by technological backwardness, low level of production and high population growth rate to attain economic growth and development, the environment is more likely to be over stretched due to exploitation of available resources.

As part of the government policy towards ensuring rural development, locating a cement factory for instance in agricultural based community poses problems to farmers. This is due to the excavation of limestone, gypsum, clay and waste released by the factory into the environment.

As a follow up to section one of section two this paper, examines some of the related studies that established strong connection between the environment and economic growth.

Section three further presents empirical issues revolving around industrial location and extent of environmental damage.

In section four, the generated data is discussed while section five concludes the paper with policy recommendations on how to ensure a safe environment along with sustainable development through agriculture and industrial growth.

Litrature Review
Related Studies on Environment-Economy Interaction

Several studies have emphasized the significance of environmental resources to growth and development in several respects. It is the belief that since our needs arise from the atmosphere and ends in it, there is bound to be some contradictions.

In view of the compelling situation Kuznet (1995) for instance, claims that increased pollution in least developed countries are due to increases in income whereas as income increases, pollution declines in rich countries.

On the other hand, most of the least developed countries rely heavily on land to meet their domestic and foreign needs.

Attempts at reducing over concentration on land and shifting to other sources of growth such as industrialization shall according to Ahmed (2005) generates far better social outputs. Thus "employment, vendor operations, infrastructure utilization and other service sector activities acquire impetus".

Considering the reliance of least developed countries on agriculture, industrialization to them merely means specialising in the conversion of raw materials into industrial goods such as steel, paper and chemical. But by every standard and without adequate control, their

degree of environmental pollution compared to service economies is far outrageous. Not withstanding, for industrialization to fulfill the goal of economic development, it must be able to make the best use of available domestic resources.

It is thus important that for industrial development to take its cause, a sound agricultural foundation according to Fashola (2004) is a necessary condition for viable agro-allied industrial development of a tropical under developed country. This will however engenders natural resource depletion, ecosystem destruction and climatic changes.

These environmental problems that arise out of excessive or in appropriate resource use are more complex whenever regenerative capacity of the renewable natural resources Dasgupta and are threatened Maler (1990).

In similar vein, Oshuntokun (1999) for instance claims that the bush burning tends to remove foliage and also destroys the surface nutrients of the soil thus destroying biodiversity.

Furthermore, the emission of hazardous gases into the environment (Sighn, 1999) and the unsafe use of pesticides in agricultural systems (Aina, 1995) usually cause natural disaster such as desertification and flood.

It is therefore imperative that for the problem to be resolved, emphasis should be placed ion quantitative relationship between resource availability and agricultural growth. That is, the quantity of land, water and other natural resources needed to sustain growth.

Overtime however, emphasis has shifted to absorption capacity of the environment to cope with pollution generated by agriculture and industry. Thomas (1997) for example analyses the impact of fatal poisoning of wild birds by spent lead sheet in Europe and North America.

Copious amount of documented evidences of these problems and ways of addressing them are immense (US fish and wild life service: 1986, Gregson and Alloway 1984, Andriano: 1986, Thomas and Pokras: 1993, Pain: 1992 and Thomas:1995) to mention but few.

Furthermore, lead do not remain inert in soil, but corrode and release particulate compounds (Bunce and Thomas, 1995). Hence the problem of lead poisoning widens to include other organisms with no exemption to human beings.

Further destruction to soil emanates from massive application of chemical fertilizers, pesticides and other agro chemicals to agricultural farm lands thus constituting the single most important difficulty faced in large scale agricultural projects.

Attainment of growth through agriculture to ensuring industrialization can only be sustained with minimum negative impact on the environment.

Else, the environment becomes an unsafe place to live in thus necessitating the need to ensure a balanced ecosystem. Once this is achieved, economic growth devoid of serious environmental consequences is sustained (Subair, 2004).

Leading authors that share similar opinion on the attainment of economic growth without much damage to the environment at the same time are Kadekodi (2001), Kuik and Gilbert (2002), Oshuntokun (1999), Ruttam (2002) and Shane (1998).

Limits to Agricultural Production

The relative limited nature of environmental resources often demand that the same location be used for both agricultural and industrial purposes. Coincidentally industries source for their raw materials from land which is often used by the residents for agricultural production. Sometimes the residents are relocated and at times relocation is impossible. Hence at such times, agricultural activities take place within the industrial environment.

Be as it may some industries are located within a particular location on the basis of available mineral resources. Extracting the mineral resources tend to widen the economy base and reducing unemployment, providing raw materials for local industries and for exports,

opening up of remote areas and provision of infrastructures. These are the positive effects mining of according to Ogezi (1992).

In addition to the benefits derived from mining, it also produces several backward, forward and final-demand linkages with other sectors of the economy.

For instance, in order to maximize economic returns, ores are mined more quickly especially in large, low-grade open –cast deposits. This causes major harmful impact on the environment in terms of significant solid, liquid and gaseous wastes which often pollutes the environment through the release of trace elements and other materials which engender land use, water use, ecological, air-use and socio-economic impacts.

Upholding this submission, Aina and Salau (1992) observe that excavations for laterite and sand, quarrying for clay, gravel and stones are common features in many different parts of Nigeria. Eventually this result into land degradation and ecosystem destabilization.

Igbozurike (1983) further notes the specific impacts as "land surface devastation (including erosion), land subsidence, disruption of drainage systems, deforestation, excessive water draw down and lowering and contamination of water table".

Buttressing the extent of spill over effects of industrial activities on agricultural productivity, Subair (2004) observes that locating cement factory in a farming community poses problems to agricultural farmlands. This has been attributed to excavation of limestone, gypsum and clay including the disposal of its waste like cement dust and slurry water into the environment. This is summarized in the diagram below:
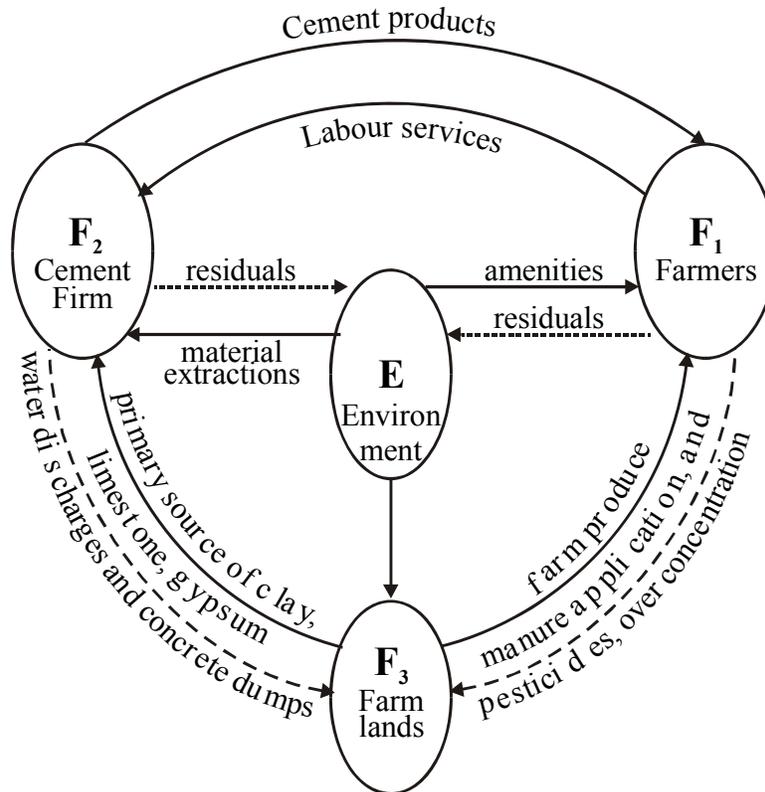

Figured 1: Environment, Agricultural and Industrial Nexus

The effect of water discharges and concrete dumps by the factory (F_2) are the increase in phosphate (P_H) value of the stream water and inability to reforest or cultivate farm lands (F_3) (Okafor, 1986).

This ultimately encouraged the farmers (F_1) to exert more pressure on available lands through the application of manure so as to attain higher productivity.

Subsequently the soil texture and its nutrients are damaged.

In summary, the actions of human beings most especially in the areas of bush burning during pre-planting operations, massive deforestation to meet both fuel and construction needs of rural and urban households, soil excavation and soil surface exposure to agents of erosion at mining sites, water and air pollutions during oil exploration tend to limit agricultural productivity.

Data and Methodology
Data Collection Procedure

The study was carried out in Ewekoro with the use of Owode as a control location.

Ewekoro is one of the sites of West African Portland Cement Company (WAPCO) blessed with large deposits of limestone – the major raw material in the production of cement.

The Ewekoro plant of WAPCO is located in Ewekoro local government area of Ogun State in the south west Nigeria. The local government area is bounded in the North by Abeokuta, in the East by Obafemi – Owode, in the West by Yewa South and in the South by Ado-Odo Ota.

Majority of the inhabitants are farmers and the area is largely rural. Most of these farmers engaged in the planting of sugar cane, cassava, maize and vegetable. Cash crops such as cocoa, kolanut and oil palm are also cultivated. These farmers also engaged in the rearing of livestocks like small ruminants, poultry and pigs.

On the other hand, Obafemi-Owode local goverme,nt a non-WAPCO site is all rural community bounded in the East by Shagamu. Besides sharing boundary with Ewekoro in the West, it also shares boundary with Oluyole local government of Oyo State in the North and Ifako-Ijaiye local government of Lagos State in the South.

Since majority of the residents are farmers, most of them engaged in the cultivation of rice, maize, cassava, yam, oil palm and kolanut. Though they are equally rearing small ruminants, poultry and pigs.

The population in the study was based on management and staff of WAPCO and farmers in the study locations. In all iii respondents made up of ii staff of WAPCO and 100 farmers from the areas of study were carefully selected.

One management staff and ten other staff of WAPCO were selected through systematic sampling procedure using the staff list as the sampling frame.

Fifty farmers were also randomly selected from the list of farmers made available by the Village Extension Agents (VEAS) of the Ogun State Agricultural Development Progaramme (OGADEP) for each study area.

Structured and open-ended questions were used to generate the primary data. However, secondary data in respect of the company's profile and services to the communities were obtained mainly from the management staff. Data on appointable positions, employment history and work details were obtained from the other staff of WAPCO.

The WAPCO staff were able to complete the questionnaires with little assistance because of their relative educational background. On the other hand, the farmers were interviewed by the enumerators in each of the studied locations.

Analytical Techniques

Besides description statistical tools, multiple regression model was used to investigate the major determinants of agricultural output in an industrial location. The explicit function for the regression model was:

$Q = F (X_1, X_2, X_3, X_4)$

Where:

Q = Agricultural Output

X^1 = Land use

X_2 = Quantity of Seed

X_3 = Bags of Fertilizer

X_4 = Other Inputs.

Analysis and Interpretation Of Results (Farmers' profile)

Table 1: Distribution of Respondents by some Personal Characteristics in study locations.

Characteristics	Ewekoro N = 50	Owode N = 50
Sex (%)		
Male	96	86
Female	04	14
Average Size of Household		
Male	5.56	3.65
Female	3.98	3.85
Total	9.54	7.50
Years of Formal Schooling (%)		
None	46	42
< 7 years	30	28
7-9 years	04	10
10-12 years	04	10
12 years +	16	04
no response	00	06
Age (%)		
< 20 years	00	00
21-40 years	16	28
41-60 years	70	32
60 years +	14	40
no response	00	00

From table 1, the socio-economic characteristics of the farmers were complied in terms of average size of household, literacy level and age for the studied locations.

While Ewekoro was inhabited by 96 percent male and 4 percent female, Owode was inhabited by 86 percent male and 14 percent female from the total sample size of 50 respondents.

On the average, the household in Ewekoro was comprised of 5.56 male respondents while that of Owode was made up of 3.65 respondents.

With Ewekoro recording 3.98 female respondents per household, Owode recoded 3.85 female respondents. The aggregate average size of 9.54 respondents was recorded in Ewekoro with 7.50 respondents recorded for Owode.

In terms of education, 46 percent did not receive formal training in Ewekoro while that of Owode was 42 percent of the total sample size.

Through 30 percent and 28 percent received less than seven years training in Ewekoro and Owode respectively. At the same time, 8 percent in Ewekoro and 20 percent in Owode had formal schooling of between seven to twelve years training.

For twelve years and above, 16 percent was recorded in Ewekoro and 4 percent recorded in Owode.

Finally only Owode recorded 6 percent no response to school training during the study period.

Going by the age distribution, the percentage of active labour force was between the ages of 21 and 60, from which Ewekoro recorded 86 percent while Owode recorded 60 percent. Most active members of labour force engaged in farming activities as shown in the occupational characteristics of these farmers in the locations of study.

Table 2: Occupation Characteristics of Farmers

Characteristics	Ewekoro N = 50	Owode N = 50
Main Occupation (%) Farming	52	96
Others	48	04
No response	00	00
Average length of residence (yrs)	17.92	35.43
Average length of farming experience in the community (yrs)	13.4	24.70
Average length of farming experience (yrs)	15.56	29.07
Major growth crops (%) Maize	10	08
Cassava	72	68
Vegetable	04	00
Cocoyam	02	04
Kolanut	00	00
Yam	04	00
Plantain	00	04
Rice	00	08
Others	08	08
Types of livestock (%) None	08	16
Goat	48	10
Sheep	32	10
Poultry	12	64
Rabbit	00	00
Others	00	00

From table 2, out of the total sample size interviewed 52 percent and 96 percent engaged in farming activities in Ewekoro and Owode respectively.

About 48 percent of the Ewekoro farmers were also engaged in other occupations. In Owode however, other occupations were insignificant because it was predominantly occupied by farmers.

The average years of residence of those farmers interviewed in Ewekoro was 17.92 and 35.43 in Owode while their average length of farming experience were 15.56 years and 35.43 years respectively.

Most of the farmers had considerable length of farming experience within their communities to the periods of 13.4 years in Ewekoro and 24.7 years in Owode.

The proportion of farmers that engaged in maize production was 10 percent while 72 percent engaged in cassava production. About 4 percent of these farmers were involved in vegetable production, with 2 percent of them diversifying into the production of cocoyam and 4 percent in yam production. The remaining 8 percent of these farmers engaged in the production of other commodities not mentioned in this study.

In Owode too, only 8 percent of the farmers engaged in maize production with 68 percent engaged in cassava production while none engaged in vegetable production.

Further to this, 4 percent engaged in cocoyam, 4 percent in plantain, 8 percent in rice and 8 percent in other commodities.

On the hand, 92 percent of the Ewekoro farmers engaged in livestock production with 48 percents, 32 percent and 12 percent involved in goat, sheep and poultry production respectively. But in Owode only 10 percent were involved in goat production with 10 percent and 64 percents of them engaged in sheep and poultry production respectively. It is equally important to note that while 8 percent did not involve in livestock production in Ewekoro, 16 percent did not also involve in livestock production in Owode.

West African Portland Cement Company's (WAPCO) Profile

WAPCO is a public limited liability company registered in Nigeria with its corporate headquarters originally located at Ikeja in Lagos State but later relocated to Shagamu in Ogun State. This was due to reorganization carried out in 2002 in order for the company to realize its goals inspite of the harsh economic conditions in the country. The company's lines of production included elephant cement, paints, motor rewinding parts and electrical parts.

The company's engines were operated with the use of coal, electricity generating plants, petrol, diesel and hydroelectric power in that order. Though its major source of power generation was the coal used to generate power in the kilns.

The major raw materials used at WAPCO were limestone, scale, red alluvium, gypsum and water. In most cases, the raw materials were sourced locally with large quantities of 2500 tons of limestone, 200 tons of scale and 200 tons of red alluvium used daily.

Table 3: Farmers' Description of WAPCO Activities in Ewekoro

Awareness of the years of WAPCO existence	19.65 years
Major products of WAPCO	Cement, paints
Major raw materials used	Limestone, clay
Method of harvesting raw materials	Mined from the soil in the forest
Kinds of wastes generated	(%)
Cement dust	94
Slurry	04
Smoke and soot	01
Others	01
No response	00

From table 3, the major wastes generated by the plant were cement dust and slurry water. While the cement dust was disposed through the precipitator, the slurry water was channeled to nearby drains and streams.

Through the farmers claimed that since the existence of the company in their community for almost twenty years, they had been facing the problems of heavy smoke and soot emission.

Going by the nature of operational schedule of the company's plant, about 93 percent of the total sample size interviewed were male a shown in the table 4.

From the total work fore, the highest ranked occupation was technician since it constituted about 29 percent of the total work force sampled. In other words and by corroborating the nature of the plant's operational schedule, an average worker was a technician.

Table 4: Characteristics of WAPCO Staff Interviewed

Characteristics	N = 14	Mean /Mode
Sex Male Female	(%) 92.86 7.14	 Male

Designation
Manager
Engineer
Technician
Secretary
Others: Est. farm supervisor
    Fire security
      Account supervisor
      Security
	
	14.29
	14.29
	28.57
	14.29
	
	28.57
		
		Technician

Length of working experience < 5 years 5-10 years 10 years +	 21.43 35.71 14.21	 7.75 years
Length of work with WAPCO < 5 years 5-10 years 10 years +	 50.00 35.71 14029	 4.50 years

The average member of staff had about eight years working experience with an average length of service with WAPCO revolving around four years.

Impacts Measurement of WAPCO Activities on Agriculture

An inverse relationship emerged while measuring the impacts of WAPCO'S activities on the farmers' productivity.

Thus as the company's activities increase so the environmental hostility to agricultural activities increase.

Hence subair (2004) viewed WAPCO'S impact on agriculture as the "consequence of direct interaction with the physical environment" The interaction was as a result of mining of limestone, gypsum, scale and emission of cement dust as well as channelization of slurry water.

To about 40 percent of the Ewekoro farmers, damage to soil structure was the most dangerous consequence of WAPCO'S mining activities.

The farmers further upheld that the spill over effect of the damage to soil structure was reduction in the available land for farming.

Moreso, there had been increase in crop failure due to decrease in soil fertility.

Furthermore, the aggregate effects of the company's activities on agricultural productivity were based on the estimated benefits from maize / cassava production by the farmers in the location of study.

Our estimated benefits had been based on maize / cassava production since there were commonly cultivated in the two areas of study.

From table 5, average land cultivated for maize / cassava production in Ewekoro was 1.10 hectare compared to that 1.32 hectare of land cultivated by Owode farmers.

The discrepancy in the hectares of land cultivated was due to the fact that while some farmers in Ewekoro had the opportunity of doing part-time job with the Cement factory, the same opportunity did not avail to Owode farmers. This was corroborated by the lower.

Average variable cost (AVC) of #10,538.44 incurred by Owode farmers compared to that of #13,686.15 incurred by Ewekoro farmers.

Table 5: Estimated Benefits of Maize/Cassava Production in Ewekoro and Owode Farms.

Estimates	Ewekoro	Owode
Average Land Cultivated (ha)	1.10 ha	1.32 ha
Average variable cost of Production (N)	13,686.15	10,538.44
Average Revenue from Production (#)	47,7444.79	61,745.60
Average Gross Margin from Production (#)	34,058.64	51,207.16
Average Profit /hectare from Production (#)	30,962.40	38,793.30

Worst still, the Ewekoro farmers earned less revenue compared to that of Owode farmers. The average revenue of Ewekoro farmer was #47,744.79 while that of Owode farmer was #61,745.60.

Furthermore, the average gross profit per hectare (AGP/ha) per unit of land was higher in Owode than in Ewekoro. While a farmer made an AGP/ha of #38,793.30 in Owode, a farmer from Ewekoro made an AGP/ha of #30,962.40 from maize / Cassava production.

The study further established the causal relationship between agricultural output (Q) in an environmentally deteriorated location and various inputs compared to an environmentally friendly location. This was necessitated by the need to establish the way forward in managing the environment for sustainable agricultural development.

Based on the excavation activities of WAPCO in Ewekoro, it was expected that the hectare of land cultivated would show a negative and significant relationship with production. However, since Owode did not fall within the cement factor's location, the expectation should be the reverse.

Other inputs effects were though tested, but to a greater extent, land in this circumstance served as the fundamental factor of production. However, the effect of these other inputs on agricultural production were expected to be positive.

From table 6, the coefficients of determination (R^2) indicated that the inputs influenced agricultural production in the two locations but by different dimension.

In Owode the degree of dependency of agricultural production on its inputs was 42 percent while that of Ewekoro was 83 percent.

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Table 6: Regression Coefficients and Level of Significance of Independent Variables Related to Agricultural Productivity in Owode and Ewekoro.

Locations	Dependent variable	Constant Values	Independent Values				R^2	F-Values
			X_1	X_2	X_3	X_4		
Owode	Q	25792 (3.21)	-5049 (-1.27)	1.28 (0.43)	2.95 (1.29)	0.91 (2.32)	0.42	2.66
Ewekoro	Q	32276 (12.83)	21748 (6.88)	-1.07 **(-1.71)**	-2.22 (-4.30)	-0.61 (-1.88)	0.83	42.81

Note: t- statistics in brackets below the regression values.

It was surprising however to note that the relationship between hectare of land cultivated (X_1) and output realized was negative in Owode thus not conforming with a priori expectation.

This implied that diminishing returns had set in since most of the farmers concentrated on limited percel of available land. Contributing more to this problem was the rare opportunity of engaging in part-time job as obtained in Ewekoro.

Furthermore, inspite of the problems faced by Ewekoro farmers, some respite in form of support services from the pollutant (WAPCO) were still rendered to the farmers though not enough to cover their losses.

However, all other inputs (X_4), seedlings (X_2) and bags of fertilizers (X_3) positively influenced agricultural production in Owode but negatively influenced same in Ewekoro.

This further confirmed that the cement company's activities negatively impared the performance of other supporting inputs to land.

Hence irrespective of palliative measures proffered to free farm lands from environmental hazards without taken cognizance of the quality of other supporting inputs, agricultural productivity would continue declining.

Finally, the overall regression equation's F-values were found to be statistically significant at 5 percent level.

Conclusion and Implication For Policy

It is concluded in this paper that despite the fact that agriculture plays vital roles in industrial development, industrialization has continued to undermine agriculture.

This is through the environmental problems it has generated through excavation and consequent soil destruction.

For these problems to be solved there must be sound environmental policy towards ensuring compliance with stated environmental standard expected of any industry.

In this wise, WAPCO should be forced to treat its wastes (cement dust and slurry water before disposing them. Where it fails, heavy sanctions should be imposed on the company.

Notwithstanding, the farmers should be enlightened on how to apply chemical to different crop quantity and when to do so. In addition some measures like deep and frequent tillage should be introduced to the farmers in order to help them maintain or even improve the soil fertility.

Finally in order to maintain cordial relationship with farmers in its areas of operation, WAPCO should adopt a small bargaining solution by compensating those farmers whose farm lands have been destroyed with the environmental protection agents facilitating the arrangement.

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GROWTH AND DEVELOPMENT

Assistance or Subjugation:
The Impact of Microcredit on the Poor

Gökçe Günel
Koç University

Özge Aytulun
Koç University

With the changing definition of poverty, the poverty alleviation programs also take a different shape. Poverty reduction is no longer under the mere jurisdiction of the state and civil society: Market economy has also become an important actor. Microcredit, defined as a loan which financial institutions give to the poverty stricken people who do not have any collateral to start small businesses, is a significant tool, which has been encouraged both by international organizations like World Bank and UNDP, and by most developing country governments. In Turkey, microcredit has been initiated in 2002 by a civil society organization. Afterwards, the incumbent Justice and Development Party (JDP) government has paid special attention to microcredit: A member of the parliament from JDP, inspired by the Bangladeshi experience, started a foundation in association with the Grameen Bank. Currently, a microcredit bill that has been drafted by the same parliamentarian is being discussed. In this context, the traditional means of lending are being dissolved, while new opportunities are being laid out for major commercial banks and financial institutions. This article argues that through microcredit the poverty alleviation discourse is being used in order to promote market integration and deepening, thereby connecting the poor with the national and global economy. It is also a part of the neo-liberal governance structure, subjugating the poor to the market forces. Drawing on elite interviews with policy makers and civil society members, and in depth consultation with primary written sources, this study aims at contributing to the on-going debates by looking through the Turkish lens.

Introduction

While the second half of the 20th century has become an era of advanced technology, high economic growth and rising living standards for a number of industrialized countries, the rest of the world has not benefited from the advantages of globalization and neoliberal policy paradigms equally. Globalization has failed to create a just society; while enriching a minority, it left the masses dissatisfied. As a result, income inequalities and rising levels of poverty continue to persist in different parts of the globe, especially in the less developed countries, although the industrialized countries are not immune from the poverty problems.

Poverty is by no means a new phenomenon. However, in recent decades it is very much on the international agenda with the impact of organizations like the International Monetary Fund (IMF), World Bank (WB), International Labor Organization (ILO) and United Nations Development Programme (UNDP). The emergence and spread of microcredit programs as a new strategy of poverty alleviation, through which the poor receive small loans on the basis of their membership to self-regulating groups, has been inspired by this new concern on the part of global actors. Governments, NGOs and the private sector have worked in accordance in order to supply microcredit to the poverty stricken. This type of poverty alleviation mechanism emphasizes the unavailability of financial resources to the poor as a significant factor that induces poverty. Microfinance helps the poor become self employed and thus generates income and reduces poverty.

This paper focuses on the microcredit operations in the context of Turkey. Yet, it does not reach any conclusions as to whether microcredit is an effective strategy for solving poverty related problems. We underline that we do not have the data to assess the grassroots effects or responses to microcredit. Instead, our emphasis is on the elite discourse. We argue that the discourse of poverty alleviation is being exploited as a means to extend the reach of banking institutions. The poor have been reinvented as a new market segment that has many demands to satisfy. Microcredit institutions are organized in the way that turns the real need of the poor into real demand while ensuring that the institution profits from this operation, which is actually what makes this demand effective. Microcredit is portrayed to be a mere poverty alleviation tool with no benefits for the supply side. Still a close examination of the elites' voice provides us with the evidence that microcredit is actually just another financial instrument that is particular in its target market. For our analysis, we interviewed three elites from two microcredit organizations (Maya and Turkish Grameen Bank Project) that operate in Turkey[1]. The interviews we conducted demonstrate that the elites perceive the poor as a huge market, and microcredit as a profitable business.

In this paper, first we will give a brief historical account of the development of microcredit. Later, we will focus on the Turkish case. Our exploration of this case will involve three different variables. We will discuss Maya which is the pioneer organization in Turkey. Then, we will articulate on the operations of Turkish Grameen Bank Project (TGMP). Finally, we will outline our projections regarding the involvement of commercial banks in this newly emerging sector.

A Historical Framework

The poverty-stricken segments of the society have always had their traditional methods of access to financial resources. Such means to financial resources have occasionally

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[1] We have conducted three interviews. Two of the interviewees are from Maya; Didem Demircan and Belgin Güzaltan. One of the interviewees is Aziz Akgül, who is the founder of TGMP and also a deputy of Justice and Development Party for Diyarbakir.

exploited the poor, while at the same time serving their needs. Yet, it is only recently that formal financial institutions, which have evolved to serve the financial needs of the rich, have recognized the poverty-stricken as a potentially profitable market. Hence are the creation of microfinance institutions (MFIs) around the world, and the interest of commercial banks to involve with this marginalized segment of society.

For centuries traditional mechanisms have supplied the financial needs of the poor in many different parts of the world. So, why does the world pay so much attention to this emerging trend of business, or of poverty reduction, namely microcredit? Microcredit is defined as "a loan which a financial institution gives to the poorest people who do not have any collateral to start small businesses" (Tan, 1997, p.233). Banks offer services to people who have some form of collateral to guarantee that the credit is repaid. The microcredit concept switches this proposition, as it involves giving loans to the very poor in order to facilitate their self-employment and self-reliance. In the words of the founder of ACCION International, a large microfinance institution, microcredit is designed to facilitate the participation of the poor in the free market system. Microfinance is sustainable if and only if it is profitable. It actually overrides the idea of cost effectiveness as it is a profitable business on its own right. Also, it is argued to contribute to the empowerment of women in regards to their social and economic positions in the society via financial development.

The idea of microcredit has been invented by Dr. Muhammad Yunus, founder and managing director of the Grameen Bank, in Bangladesh. The idea sparked up when, in 1974, Dr. Yunus took his students to a field trip to a poor village. Upon interviewing a woman who made bamboo stools for a living, they learned that she had to borrow the equivalent of 15 pieces to buy raw bamboo for every stool she made. After paying the middlemen, sometimes at rates as high as 10% a week, her profit diminished to two pennies a day. Actually, she had become a bonded laborer to the trader whom she borrowed from. They thought if she can borrow at more advantageous rates, then she would be able to uplift her standards above subsistence level. When Dr. Yunus calculated the money forty-two people in one village needed were twenty-seven dollars, he was shocked. Thus, in 1983, Grameen Bank, meaning the village bank, was founded (Yunus, 1997). Dr. Yunus argues that conventional banking is designed to be biased against the poor. The existence of collateral is a simple proof of this. Also, Dr. Yunus observed that only 1% of the borrowers in Bangladeshi conventional banks were women. This signified a bias towards women as well. Thus, he decided to incorporate women in the banking system when he founded Grameen Bank. The clients of Grameen Bank do not have to show any collateral for the credit they borrow. They are not required to have a strong credit history. Instead, they are jointly liable for paying off the interest and the principal (Woodworth, 1997). Dr. Yunus accentuates that poverty is not created by the poor, but by institutions and policies. The inherent mindset of the people is structured in the way to accept poverty as a given (Yunus, 1997). Therefore, Dr. Yunus believes poverty has to turn into an artifact in a history museum: It should not belong to the world of today.

The biggest microfinance networks now are Opportunity International, FINCA, ACCION, ProCredit, Women's World Banking and Grameen. These organizations mainly differ in their *raison d'etre*. On one hand, there are networks that were not intended to profit. Most of Grameen, FINCA and Opportunity International's projects can be classified under this heading. They offer more relaxed repayment schedules and interest rates. Instead of seeking profit, these microfinance organizations look for methods that will enable the sustainability of their operations. Eventually, they have been able to generate donor funds through creating good publicity for their operations. Even though good publicity can help raise funds, the sustainability of donor funds has been questioned. A large number of microfinance institutions thus arrived at the conclusion that the best method to reach the poor people in the world is to become profitable and to operate like conventional financial

companies, thus granting sustainability and independence from donor organizations. It has been argued that profitability will transform microfinance from being a niche operation into a ubiquitous one.

A major change took place in 1992, when PRODEM, a small Bolivian non profit organization in the ACCION network, turned part of its operations into BancoSol, a commercial bank that targets the poor. In the beginning, BancoSol charged a 65% interest rate for its operations. Now, its annual percentage rate is 22%. The feasibility of these operations, even during times of economic downturn in Bolivia, called for further transformations in the ACCION network. ProCredit and FINCA followed this line of thought. Offering financial services to the poverty stricken did not attract any interest from large commercial banks due to the small amounts of money involved[2].

However, this attitude is also being transformed. Countries like Brazil, Venezuela and Colombia impose interest rate ceilings to commercial banks that lend to micro enterprises. It has been suggested that it is a bad idea to impose such interest rate ceilings as they make it impossible for the microlenders to cover the administrative costs for entering the markets that demand microfinance operations (Helms & Reille, 2004). Furthermore, it is argued that "the best way for governments and donors to lower interest rates without making microcredit unsustainable is to promote competition and innovation, both of which to improve efficiency and lower prices" (Helms & Reille, 2004: 14). A key assumption of this argument is that the poverty stricken people do not demand cheap credit, but *access* to credit. Therefore, it is reasonable for microfinance institutions to increase interest rates in order to widen outreach. The impact of increased interest rates on the segments served is another question. While restaurants and tailor shops, that make high margin investments, are able to benefit from microfinance, livestock raising, handicrafts and agricultural processing cannot afford such high interest rates, due to the moderate returns of their activities. As a result, the term "best practice" employed by microfinance institutions to describe the win-win conditions of microfinance brings forward questions regarding the definition of "best". Is it best for economic efficiency with no concern for social equity? What is it good for, MFIs or the poor households? The target market of microfinance has been defined as the core poor, which is something between destitute households and richer households. A recent BancoSol study suggests that their clients are the richest of the poor or the non-poor, with poverty being based on access to a set of basic needs like shelter and education (Murdoch, 2000). Yet, there is an inherent irony in this story, as a sector, initiated by NGOs, is beginning to emulate the standards of the very industry that failed to meet the great demand for financial resources for the poor households in the first place (Dunford, 1998).

The Case of Turkey

The emergence of microcredit in Turkey has been very recent. There are only two institutions that offer microcredit in distinct parts of the country. One of these institutions is Maya, which is a commercial enterprise that belongs to Foundation for the Support of Women's Work (FSWW). Maya offers credit in the Marmara region, in cities like Izmit, Adapazarı and Istanbul. The other is the Turkish Grameen Microcredit Project (TGMP), initiated by Turkish Foundation for Waste Reduction, which focuses its operations on the Southeast of Turkey. This institution has been founded by Aziz Akgül, the Development and Justice Party deputy for Diyarbakır.

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[2] "The Hidden Wealth of the Poor", *The Economist*, November 5, 2005

Maya

The first Turkish microfinance institution has been founded in June 2002 by FSWW in Izmit. The process actually began in 1995 when FSWW initiated a pilot project for 100 women in Istanbul. An interviewee from Maya emphasizes that it was the grassroots who demanded the capital in the first place: women approached the association, saying "we wish to found enterprises, but we do not have access to cash[3]". Microcredit was the solution the association began to offer. FSWW had heard about microfinance before, but did not know how the Turkish setting would respond to the program. In the end of two years, the project turned out to be successful. The debtors did found new enterprises, while returning the money they borrowed on time. Thus, FSWW decided to enlarge its operations regarding microcredit.

However, the 1999 earthquake shook the association; their priorities were shifted to relief work. After the earthquake relief, hit the economic crisis in 2001. During this period, the donor agencies were not very interested in funding the formation of a Micro Finance Institution (MFI). Yet, in 2001 FSWW was offered a generous aid, and began working on Maya. Maya has been founded as a commercial enterprise that belongs to FSWW. Due to the absence of a clear legal framework regarding microcredit operations, FSWW had to put a lot of effort into the inauguration of Maya. An interviewee from Maya points out that "they even had to meet Kemal Dervis in person in order to receive the necessary permissions". Finally, it was registered as a formal financial institution that lacks a certain legal status. When asked why this structure was preferred, the interviewee explains that providing credit has always been associated with banks, which are commercial enterprises. An MFI also generates money, like a bank, even though it does not profit from it. It only earns enough money to sustain its operations. Eventually, the income generating profile of MFIs has pushed the FSWW to adopt a business enterprise status. Yet, it should be emphasized that this decision is dependent on the regulations regarding the status of MFIs in Turkey. Therefore, the interviewee adds that they would reformulate this status upon the changes in the law. If the new regulations enforce them to remain a business enterprise, then they will do so, but if they entail a conversion, then they would follow up with that as well. Currently, Maya is entitled to pay banking insurance and to adhere to bank taxing laws, which requires the payment of transactional taxes and stamp taxes. Maya does not charge a separate tax from its customers, but includes the tax inside the credit debt.

This story carries the implication that NGOs that work on microcredit are actually utilized as tools that inspect the given micro-market, hence decreasing the risk involved with such entry for commercial banks. It reveals a re-framing of NGOs as market actors. Once they adopt the goal of becoming self sustaining companies, NGOs may alter their foci, concentrating on how to sustain their operations instead of a total elimination of their activities, which are mutually existent with poverty. In other words, NGOs' existence depends on the existence of poverty and they intend to sustain such operations, which imply a continuation of poverty. The fact that Maya maintains the livelihood of its staff through credit operations should not be dismissed. Since the staff derives their resources from the poor themselves, their perception of the low-income women may be rendered into clients.

Maya's mission is "to provide small loans to low-income women who wish to set up a business or develop their existing businesses". The women who have been excluded from the conventional banking system are the target market. Yet, upon initiation Maya had a hard time communicating this mission. An association offering credit was unheard of. Eventually, only 37 people benefited from credit during 2002. As of December 2003, they had reached only

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[3] "İş kurmak istiyoruz ama nakit para bulamıyoruz." See interview with Maya directors, 28/12/2005

356 women. However, word of mouth was an effective method in generating awareness and interest. By the end of 2005, Maya has 1350 active members. It has offered around 3000 credits in 3.5 years. Maya has different credit portfolios targeting different segments of the poor. One segment is the poverty stricken that cannot offer any collaborative for its borrowing. This segment is offered MayaWe, a group credit which involves the participation from three to ten women. The women have to form their own solidarity groups as they will be each other's guarantors once the credit is taken. Each member can borrow different amounts, but they pay back as a group. For another segment of the poor, MayaMe and MayaFamily loans are available. The applications are made individually for these loans. The applicant may have her solidarity group members as guarantors or find a third party as her guarantor. If she does not belong to a solidarity group, then the applicant needs to provide collateral. An interviewee emphasizes that during this process, they require two guarantors who are on a payroll. The possibility that people may lose their jobs pushes Maya to require two guarantors instead of one. They do not prefer the artisans as guarantors, as their income is pertinent to higher risk.

	MayaWe	MayaMe	MayaFamily
Purpose	Expanding business Business diversification Buying merchandise/ supplies	Expanding business Business diversification Buying merchandise/ supplies	supplies Paying bills Health expenses Emergency needs
Amount of Loan	100 - 900 million TRL	100 million - 2 billion TRL	100 - 500 million TRL
# of Installments	3, 4, 5, 6 or 8 months	4, 6, 8 or 12 months	1, 3, 4, 5 or 6 months
Frequency of Installment	Monthly installments	Monthly installments	Monthly installments
Collateral	Solidarity group	Solidarity group Guarantor Pledge of gold/ foreign currency/ vehicle/commodity	Solidarity group Guarantor Pledge of gold/ foreign currency

Table 1 Maya Product Portfolio (Source: KEDV website)

The above table, which outlines the activities of Maya, is actually a business development program. It includes market research, which identifies the poor as an emerging market, as well as marketing tools that are required to ensure the promotion of the product. It follows the business mentality that dictates the AIDA model for market entry: Awareness, Interest, Desire and Action. Also, it employs market segmentation in order to facilitate the diversification of a product portfolio. This business plan clearly demonstrates that the credit supplied by Maya is a product, which is not very different from any commercial item sold in a supermarket. The segmentation signifies a departure from the original intentions of poverty alleviation, as MayaMe and MayaFamily target a more selective income group. The real poverty stricken people are mandated to cope with the solidarity model which capitalizes on the trust base of the group in order to impose discipline and control. Even though microcredit is framed as a poverty alleviation tool, the inherent logic cannot escape that of a product's. Thus, Maya makes use of the poverty alleviation discourse in order to promote its product in a newly discovered market, which consists of the poverty stricken households.

Also, this model somehow conflicts with the former proposition, which emphasizes that the initiation of microcredit was upon the demand from the poor. If the poor households were in need of credit, how come they ignored it during its initiation? Maya admits that their reach was not as high as they expected and links this to the financial crisis that preceded their market entry. They argue that the use of the word "credit" was an offense to the poor as it

reminded them of their former borrowings from the banks, which had eventually failed. Even though this is a crude explanation to why there is less interest in credit than expected, it also contradicts the former argument that microfinance is a bottom up process, triggered by the demand from the poor. Microfinance, in other words, was an instrument invented by the market to convert the needs of the poverty stricken into effective demands. It was not bottom up – it was actually the market's perception of the poor that gave rise to microfinance activities.

Maya's members, or clients, are women. Most of them are single, divorced or widowed. Therefore, they have to make a living on their own. They do not become entrepreneurs out of freewill, but out of the conditions that they cannot control. Also, of the 1300 members, 350-400 are Roma people. Our interviewees point out that Roma people have a tradition of work that does not exclude women from business life. Also, when explaining the microcredit initiation process she touches upon how Izmit was a suitable place to begin, as the women in Izmit are more familiar with business environments. Thus, there is a clear bias towards women who are already immersed in a business understanding. This difference in women's relationship with men influences the activities that women handle. A woman that borrows from Maya is obliged to continue its reproduction of home based work, which is the only key to her survival and her repayment of debt. She specializes on what stereotypically are perceived to be women's work, like handicrafts, lacework, drapery production and sale or beauty and cleaning products. Actually, Maya capitalizes on these stereotypes in order to generate a livelihood for women. Yet, it also reinforces the boundaries between what is considered men's work and women's work, thus debilitating gender equality in a way.

Maya does not engage in legal action for the collection of debt, unless there is no other way out. They improve their dialog with the clients in order to ensure their return of the debt, once again utilizing social pressures in order to grant sustainability. An inherent reason to why Maya is not interested in legal action is the costs it entails. A lawyer that takes care of the legal action associated with 100 YTL charges the same amount when dealing with 100,000 YTL. Thus, the costs for legal action are immense when compared to the rotating amount of money. Eventually, Maya tends to escape from legal action as much as it can. This attribute also points out the ratification of sustainability over all else.

The Turkish Grameen Microcredit Project

The Turkish Foundation for Waste Reduction operates the Turkish Grameen Microcredit Project (TGMP), which underlies motives shared with the Grameen Bank. As an effect of the economic crises, which fostered a context of rising unemployment, low income women's demand for employment has increased immensely. Therefore, the NGOs in the region, cooperating with the government, began to orient themselves to develop activities that promote income generation. Most NGOs have adopted small income-generating activities for low income women as a solution to alleviate poverty in the region. Consequently, microcredit has risen as an alternative strategy that may foster the resolution of the given problem.

TGMP was born in a context of increasing poverty and unemployment, which was rendered permeable by the increasing number of NGOs that concentrated on the poverty struggle and that offered small income generating activities as methods enabling an independent escape from poverty. It was launched through an agreement between Grameen Trust and the Turkish Foundation for Waste Reduction, a foundation headed by Professor Aziz Akgül, the Diyarbakır deputy of the Development and Justice Party. It has been implemented by Grameen Trust under its Build, Operate and Transfer (BOT) model with the financial support provided by the Turkish Foundation for Waste Reduction. This project was materialized as a part of the Grameen Bank Replication Program (GBRP), which was begun

by Grameen Trust for providing worldwide technical and financial assistance to Grameen Bank Replication[4].

The cooperation with Grameen Bank implies a mix of the global and the local. The global economic trends, which favor microcredit and somehow approve the operations of Grameen Bank, have outstretched to reshape the local realities of the Southeast. This direct appropriation of a global model for local problems instigates questions on how appropriate this model is for the Turkish context. It also leads to more general questions on how the relations between the global and the local should be arranged.

Actually, the cooperation between Grameen Bank and Turkish Foundation for Waste Reduction was initiated before the microcredit project emerged in June 2003. After Aziz Akgül's second visit to Bangladesh in February 2003, Recep Tayyip Erdoğan, the prime minister of Turkey, invited the Grameen Trust to begin its microcredit operations in March. Following this invitation, a mission from Grameen Trust paid visits to Istanbul, Ankara, Diyarbakır and Siirt. Consequently, the foundation organized the "International Conference on Poverty Reduction through Microcredit" in June 2003 with the participation of the Turkish government, NGOs, banks, and press and donor organizations. The final declaration of the conference incorporated demands from the government which called for an enabling environment for microcredit delivery. The government is employed with the mission to promote the development of microcredit projects by providing tax exemptions for social entrepreneurs, which attempt to solve social issues by utilizing market based principles and business models. However, it is important to emphasize that the government has also been expected to stay out of this business in order to guarantee the independence of such operations and to allow them to develop their own working principles. The draft act prepared by the government should include incentives for the transformation of NGOs into formal financial institutions. Also, it should foster the foundation of microcredit banks. The final declaration suggests that the fund provided by the World Bank within the framework of the Social Risk Mitigation Project for 2003 should be used to finance microcredit projects. Another suggested fund for financing microcredit would be The Fund for Incentives for Social Assistance and Solidarity.

Thus, the Turkish Grameen Microcredit project involves not only a mix of the global and local, but also a mix of the government, the civil society, and the private sector. It fosters the strong cooperation of the stated actors, given the government's regulative and fund-raising role in promoting the advancement of microcredit. The regulations within this framework make microcredit delivery a sector permeable to both the private sector and the NGOs. Also, it shows that the government has played the role of a mediator in rearranging the relations of the civil society and the private sector, and also of the global and the local. This also implies that as a result of the dissolution of its monopoly of power over economic and social processes, the state is adopting a new role, as the mediator between multiple actors.

The Turkish Grameen Microcredit Project in particular enjoys the support of the governorship of Diyarbakır. The central TGMP office is located inside the governor prefecture. The interviewee from Maya points out that TGMP is different from their operations as it is subsidized by the governorship: The governor assists in the organizational structure of the project by lending them an office, vehicles and drivers. It even goes as far as paying the wages for some of the employees that work under TGMP. Aziz Akgül considers the governorship to be one of the three stakeholders in this project, which are TGMP, Grameen Trust and the Diyarbakır Governorship. He explains that the ones "who find the money, who collect the donations" are TGMP and Grameen Trust, while the local governance

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[4] Turkish Foundation for Waste Reduction web site (www.israf.org)

auspices the process. Moreover, the new draft law prepared as a part of the current public administration reform also fosters an increased role in microcredit for the local extensions of governmental actors. Aziz Akgül emphasizes that for the time being, local governance has to be incorporated in the project so as to supply a legal backing[5]. In the future other governorships may begin new microcredit projects in their own provinces.

In terms of its financial and organizational policies, Turkish Grameen Bank is an appropriation of the Bangladeshi experience. As noted before, it does not conceive poverty to be a result of individual incapacity but as a result of external actors and structural problems. Thus, the poor also have the ability to advance their status if they are given the necessary back up and initiation. In a TBMM discussion, Akgül openly states his belief in this principle:

The poor are as smart as the rich; the poor are as intelligent as the rich; the poor are as hard working as the rich; the poor are as productive as the rich; but when they are not given the potential to manifest these virtues, when there is no motivating force, unfortunately these virtues cannot be manifested. What is the point; it is capital. So, if we lend a small sum of capital to the poor it is possible to see that they are as productive as the rich, as hardworking as the rich, and as smart as the rich[6].

Thus, the poor are no longer passive receivers of aid and charity but active players in the market. This struggle to survive is framed as a virtue of the poor rather than a reality imposed by incontrollable conditions. Therefore, the microcredit project, which is born of coordination between multiple actors, like the state and the private sector, appoints the poor as actors that need to be mobilized. Poverty alleviation will only occur if the self-capacities of the poor are born out (Akgül, 2003).

TGMP launched its first loans in Diyarbakır on 18 July 2003. Three foreign experts from the Grameen Bank implemented it together with a local staff of nine people. After the completion of the project in a three year time frame, the administration will be transferred to a local organization. As of March 2006, 2,765 million YTL has been lent to 2802 women from the urban and rural communities in Diyarbakır, Bismil and Ergani. The project aimed at reaching 4,400 women by 2006, but this aim has only been partially satisfied as of March[7]. The credits, which range between 100 and 3000 YTL with an interest of 20%, are distributed on the basis of solidarity groups. The project is different from Maya as it instigates the foundation of these groups by bringing together people from the same neighborhood. Also, it does not allow the participation of relatives in the same group. Again, it is only women who can participate in the groups, but men can also take part in the operations that the supplied loans induce. The credits are repaid on a weekly basis. A year consists of 46 weeks, excluding 6 weeks of religious festivals and official holidays. This condition fosters saving as a habit, while also protecting women from having to return large sums of debt.

After the groups are formed, they receive a one week training on the system of credit. Akgül, during the interview, explains the this training as follows: "We give them a one week training, what we do in this one week is to prepare them for credit, you know 99.9% of these women are not literate. They are stuck in the vicious circle of poverty. They do not know

what to do if they borrow money. Yet we give them a shock treatment, have self confidence we say, you can produce a lot, you are great people, you are wonderful, you are this, you are that, we motivate them. It would take half an hour to explain this to a normal person, but that constant motivation is required when we are dealing with them"[8]. This statement displays the "othering" of the poor by the elites that train them. Akgül is proud of this training as he accentuates how people begin to have ideas towards the end of the training, like "I can rent a bicycle to the kids in the street". The success of the training is therefore evaluated on the basis of how innovative their emerging business plans are.

In the beginning, only two members of the group are allowed to borrow. If these two members succeed paying regularly for four weeks, then two other members are also offered credit. Thus, the members are subordinated to the disciplinary measures of the group, like in the case of Maya. The group meetings are held on a weekly basis in the house of the group leader, with the participation of field workers as well as the branch manager. Members recite the Grameen credo in Turkish repeating after the group leader: "Disiplin, Birlik, Cesaret, Çalışkanlık" (Discipline, Unity, Courage, Hard Work). After saluting the staff, the members sit in rows on the knees, the group leader sitting at one end. Regular attendance to these meetings is another condition for further credit. In each meeting, the amount of credit received or repaid is noted by the field worker[9]. When explaining this ritual Akgül says, "for instance when we go to a meeting, it is preordained who is going to sit where in which order, who is the leader, who is the secretary, who will speak first, who will stand up, who will sit, everything is predetermined, it is disciplined just like in the military, and we obey this order"[10]. He further argues that discipline is highly required for the well functioning of any business.

The scope of activities triggered by TGMP is limited to their immediate environment. They raise live stock and wash clothes. They are involved in sewing and marketing activities. Their activities are not only confined to the environment, but also to low income. They are mostly labor intensive, but they do not bring back much profit. On the other hand, a recent issue of Referans, a business newspaper, carries one of the success stories of microcredit to its cover[11]: Kabule Cengiz from Diyarbakır, with the 500 YTL credit that she received in 2003, set up a business of renting bicycles to the kids in her neighborhood. This, although departs from the previous critics of low income and labor intensity, is an example of informalization of economy through microcredit. However, the newspaper does not shy away from carrying this story to its cover, yet it also includes critical voices from the Central Bank directed towards the risk of informality that microcredit may generate. Therefore, the employment

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[8] "Onları bir haftalık eğitime alıyoruz, bir haftalık eğitimde yaptığımız husus, onları mikrokredi almasına hazırlamak neden biliyor musunuz simdi mikrokredi almaya yönelik olarak simdi bu kadınların yüzde 99.9'u okuma yazma bilmiyor, iki fakirlikten dolayı darmadağınık, yani fakirlik tuzağına girmiş bu insanlar darmadağınık, ne yapacaklarını şaşırmışlar, iki e biz simdi kredi alacağız da nasıl ödeyeceğiz, ne yapabiliriz ki, bizim şeyimiz yok, yapacak hiçbir şeyimiz yok, diye başlıyorlar orda, sonra biz onlara sok tedavi, yani biz onlara diyoruz ki, kendinize güvenin, çok şeyler üretebilirsiniz, su kadar çok iyi insanlarsınız, muhteşemsiniz iste şusunuz busunuz, onları motive ediyoruz, sonra günler geçince bir haftalık eğitim diyoruz ya orda aslında normal insana yarım saatte anlattığımız şeyler bunlar, ama o devamlı onları motive ediyoruz, o motivasyon eğitimi"
See interview with Aziz Akgül, 07/03/2006.
[9] Turkish Foundation for Waste Reduction web site (www.israf.org)
[10] "Mesela toplantıya gittiğimiz zaman kimin başta oturacağı kimin ortada oturacağı kimin en sonda oturacağı kimin o toplantının başında lider olduğu kimin sekreteryasını yürüteceği kimin ilk önce konuşacağı kimin sonra konuşacağı, kimin ne yapacağı herşey bellidir, bunun hepsini bilirler, toplantıya girdiğimiz kimin ne zaman kimin ayağa kalkacağı kimin yok öyle şey yok çok disiplinlidir bu iş ve çok riayet ederiz ona, ne o öyle gittik evlerine onlar sallana sallana geldiler, gelemezler, oturup her şeyin bir şeyi vardır yani, asker eğitimi gibi yani."
See interview with Aziz Akgül, 07/03/2006.
[11] "Krediyle Aldığı Dört Bisikleti Kiralayıp 1000 YTL Kazanıyor", *Referans Gazetesi*, March 25-26, 2006.

produced by microcredit has the tendency to create informality, to be labor intensive and low income generating.

Moreover, the fact that women become the sole bearers of debt, while men can also participate in economic activities demonstrates how women are pushed to carry a social burden. The initial idea behind favoring women over men has been the suggestion that conventional banks have a bias against women. Akgül elaborates on the debt loyalty of poor women through an anecdote: "What does the woman do if she cannot join the meeting? Let's say it's 01.00 AM, and her child is sick, she has to go to the hospital, it's 01.00 AM, can you imagine, at this time, in the middle of the night, she knocks on her neighbor's door, I am taking my daughter to the hospital, she says, I have this much debt, take this money, and pay it tomorrow morning in the meeting. This is how the system works"[12]. In line with this proposition, an interviewee from Maya openly suggests that women are better in paying back their debt, so should be preferred over men in lending money. Therefore, it can be argued that the insistence in targeting women is a matter of credit recovery.

The poor women are, thus, a logical segment to count on for ensuring profits. Microcredit is an instrument which is utilized to reap profits from the poverty stricken. In order to illustrate the use of the poverty alleviation discourse for raising profits, the interview with Aziz Akgül proves to be a valuable resource: "According to the data retrieved from the Turkish Statistical Institute, there are 18 million poor people in Turkey, and 59% of these poor people are eligible for direct credit. They are above the age of 18. That means there are 11 million people that are available, alright? Do you see the sector! 11 million clients! Right now, I can sell money to 11 million people!"[13] This is direct evidence for how the elites of microcredit perceive their environment. They believe that it is a big market, with great needs and high profit opportunities. Following this exclamation, Akgül asks, "Smart people should enter this market immediately! Come on, are you conducting a feasibility in the name of the banks? Smart people enter the market, now Finansbank is trying hard to enter, HSBC is thinking about it, Şekerbank was considering, they have this kind of practice in their portfolio…"[14] The draft act[15], currently being discussed by the parliament, will facilitate the entry of the banks to the microcredit network, enabling tax benefits, and will also open up the way for the inauguration of microcredit institutions that will have a different status from banks or NGOs. The evolution of the draft act, coupled with words from Akgül and others, demonstrates that the financial environment is being prepared for the market rooted solutions to poverty reduction. Eventually, the poor are left with no other option but to be subjugated to market mechanisms applied through either microfinance institutions or national and international banks.

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[12] "Ne yapıyor kadın, gece saat 1de kadın, diyelim ki çocuğu hastalanmış, hastaneye gidecek, gece 1de, olur mu öyle bir şey, gece 1de komşusuna, onlar komşu olur genellikle öyle yapıyoruz zaten, prensip itibariyle, çünkü o zaman taşıma yapmaktan zaten verdiğimiz 500 lira o zaman taşımaya gidecek, komşusunun kapısını çalıyor, ben hastaneye götürüyorum diyor kızımı, bu kadar benim de on lira taksitim var, bunu al, yarın sabahleyin ver, aynen böyle çalışıyor sistem" See interview with Aziz Akgül, 07/03/2006.
[13] "Türkiye istatistik kurumunun verdiği bir bilgiye göre, Türkiye'de 18 milyon yoksul bulunur, yüzde 59u doğrudan kredi alabilir, yani 18 yaşının üstünde, 15 yaş altı bunlar, dolayısıyla mikro kredi alabilecek şu anda 11 milyon insan var! Tamam mi! 11 milyon müşteri! Sektörü görüyor musun! 11 milyon insana ben şu anda para satabilirim". See interview with Aziz Akgül, 07/03/2006
[14] "Zeki insanlarsa süratle girmeleri lazım. Siz onların adına feasibility study mi yapıyonuz, eeee, yok canım, akıllı insanlar girer, şimdi Finansbank uğraşıyor girmek için, HSBC düşünüyor, Şeker düşünüyordu, birleşme olmadı ama, onların bayağı geçmişlerinde de böyle şeyler var" See interview with Aziz Akgül, 07/03/2006
[15] The draft act is available at http://www2.tbmm.gov.tr/d22/2/2-0413.pdf in Turkish.

The Emergence of Banks in Microcredit Delivery

The United Nations Development Program motivates the participation of commercial banks in the Turkish microcredit sector. Also, the UN plan of action involves the leadership of NGOs in starting MFIs that demonstrate the profitability of such investments. This will prompt commercial banks to enter the micro-markets, while facilitating an understanding of credit and finance among the poverty stricken households (Buritt, 2003). When the operations in Turkey are examined, the ultimate aim of the UNDP seems to be an overthrow of the responsibilities of NGOs and a welcoming of banks as the main actors in solving poverty problems. The UNDP strives to convince the banks that the poor are a profitable segment, thereby encouraging the resolution of poverty problems with an enabled access to credit.

The UN meeting held in 12-13 December 2005 in Istanbul included remarks related to the legal framework of microfinance in Turkey, and also to the commercial viability of these operations[16]. Participants to the conference were mainly representatives from major commercial banks, such as Şekerbank, HSBC and Finansbank. First, the two-day meeting gave the impression that the UN, a major international organization, is also working in parallel to the government. It is also a regulatory body that tries to enhance the participation of the market in social issues. While the government assumes the role of mediation, the UNDP, as a pressure group, bids for an extended regulation of the macro economic environment, so as to attract commercial bank involvement. Second, this illustrates how UNDP, as a development agency, perceives development to be derived of commercial bank participation to poverty alleviation, therefore of profits arising from the poor. This is not only a poverty alleviation method, but also the discovery of a new segment from which the banks can benefit. The UNDP supplies the missing link between the poor segments and the commercial banks by showing the prior work conducted by the NGOs to bank representatives with frequent conferences. An announcement calling for participants for the next meeting, which will be held in Istanbul in June, 6 2006, says, "Currently, increasing number of commercial banks is exploring the microfinance sector for potential investments. However, there is no information on the demand side of microfinance and the potential impacts of microfinance on poverty reduction as well as what kind of special banking products could be designed to meet the needs of the poor. 36% of the Turkish population is considered economically vulnerable, i.e. **5.7 million households.** This is the total target group for poverty alleviation in Turkey. Microfinance is one of the recommended strategies to eradicate poverty in Turkey until the year 2015. However, the microfinance sector of Turkey is currently in its early stage of development." The numbers do not overlap with those of Aziz Akgül, but imply the same meaning.

So, how involved are the banks? In the end of 2001 Garanti Bankası has begun serving Maya. Maya signed a contract with Garanti, and the UN report claims contract to be beneficial for both sides. Şekerbank also considers investing in microfinance. Actually, it is planning to open a separate unit that will specialize on this newly emerging business. FinansBank, which has also been a donor for the Turkish Grameen Project, serves the poor via a Rotary project that was initiated in February 2005[17].

Does this mean that market economy will solve the problems that it created itself? The participation of financial institutions, like conventional banks, in poverty alleviation is actually very ironic. An interviewee from Maya, when asked what she thinks about this issue, replies that she is content with the new developments. She says that if banks take over the business of microfinance, then they can start offering microinsurance, which is another need

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[16] http://www.undp.org.tr/undp/PressRelease_13dec05_docs.asp
[17] Türkiye'de Mikrofinans Alanında Yapılanlar, a leaflet prepared by UNDP Turkey

that they have recognized. Thus, banks will have assisted them in their poverty alleviation aims, though remaining independent of social concerns. The further effects of such a program will be interesting to observe.

Conclusion

The introduction of microfinance programs coincides with the WB and IMF's keen interest in poverty. Adverse social impacts of the Structural Adjustment Programs (SAPs), which generally entailed the implementation of economic austerity measures, liberalization and privatization, have become apparent by the 1990s. The IMF and WB responded to calls for 'adjustment with a human face' by incorporating poverty reduction programs within the framework of SAPs often under the heading of social safety nets (Elyachar, 2005).

The implementation of microcredit programs, in a way, enables the implementation of neoliberal policies at the local level. The poor are no longer protected with the social policy provisions once provided by the state. Instead, they become dependent on the market. With microcredit schemes, even the poorest segments of the society are targeted to become subjugated to functioning of the market and neoliberal policies are able to permeate every segment of society with great success. Therefore, microcredit applications should not be thought separate from the broader agenda of financial liberalization. Financial liberalization is portrayed to be creating opportunities to empower the poor through enabling them to engage in entrepreneurial activities. Hence, microcredit was employed to counter social protest or political dissent, while at the same time promoting the neoliberal agenda through discourses of entrepreneurship (Weber, 2004). Microcredit departs from other approaches to poverty reduction, in the sense that it is embedded in a commercial framework. The poor are treated as economic units and they become subject to functioning of the free market, thereby becoming even more susceptible to the adverse effects of market and globalization.

This paper provides a brief overview of the development of microfinance in the world and in Turkey. First, it reports how the initial idea of microfinance has been created. Next, it outlines the development of microfinance in the context of Turkey and gives information on the operations of microcredit organizations (namely Maya and TGMP), and finally offers a brief account of present situation concerning the commercial bank presence in microcredit schemes.

This paper does not draw any conclusions concerning the effect of microcredit in poverty alleviation. Rather it emphasizes that the poverty discourse is used as an instrument of extending the reach of financial institutions. As such, it views microfinance as an instrument of market expansion. In this process, NGOs have been used as tools for assessing the newly emerging market, namely the poor, and delivering information on the profitability and sustainability of microfinance operations. The government, while being kept away from imposing direct social and economic policies due to liberal world trends, adopts a new role in this process as the mediator between the NGOs, the financial sector and the public. It is expected to lay out the comfortable environment for the advancement of microfinance delivery, as it is apparent in the draft act concerning the foundation of Micro Finance Institutions in Turkey. We would welcome an incorporation of microcredit programs with a more active government stance. What we oppose is the option that totally excludes the state and leaves the solution of the poverty into the hands of the market mechanism. Still, we adopt a dubious position as to the effects of microcredit on the poor and poverty alleviation. In order to draw more concrete conclusions, this study requires further analysis of elite discourse as well as grassroots responses to microcredit. Also, a comparative analysis regarding different

applications of microcredit in various parts of the world, and their impacts on poverty eradication would be useful in gaining insight towards the Turkish case.

Microfinance has been framed as the ultimate opportunity to combine humanitarian aid with profitable investment opportunities. However, this should not make it the sole option everywhere. Before welcoming the microcredit as a way out of poverty, possible adverse impacts, like the possibility that it can promote informality, should be taken into consideration. For the Turkish context, specifically, the application of the microcredit is a recent development and therefore requires some critical thinking before being taken as panacea to poverty.

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Growth and Development

Impact of Small Industries in Pakistan

Taqadus Bashir
Foundation University

The small industries are an integral part of economic lifeline around the world and especially of developing countries. They are a major source of ideas and employment, sustaining and stimulating the growth of industrial sector. Though these small enterprises are full of enthusiasm but also fail owing to their inexperience, lack of finances and management skills. The multinationals of the world are endeavoring to make their ingresses all over the world. Apprehension is that these small industries may not be overshadowed under the multinationals. Despite the efforts of multinationals to capture the world industry, the importance of small industries cannot be ignored. They can benefit by the disciplined approach to direct settings, which harnesses their character sense of enterprise, their capabilities and potentialities to their provision of goods and services. The study provides a brief picture about the growth of small industries in Pakistan and also reflects the attitude of government of Pakistan about this sector. A comparison of Small Industries of Pakistan & rest of the world has been presented. The study shows that various countries of the world have planned to pay proper attention on the development of small industries considering them vital for the growth of their economy and a good source of employment generation. The small industries grew at their own in the country without government planning and support. Majority of the industries are family owned in which a few persons have been employed. The agro based small industries are setup in the rural areas and remaining are in the urban areas. These small industries cover most of the industrial field out of those the prominent are light engineering, textile, garments, knitting, surgical, sports goods, hosiery, embroidery, leather goods, poultry, handicrafts, agriculture, woodwork, nursery, fisheries, lodging industries etc. The focus needs to be on setting up export oriented and value added small industries so that foreign exchange may be earned through these industries. The small industries can be utilized for producing the raw material for the large-scale industries as well as vise versa to utilize the waste of large industries. A comprehensive planning is required to channelize small industries to produce raw material for large industries and provide financial incentive to establish small industries in rural areas of Pakistan.

Introduction

Pakistan is an agrarian/developing country that is striving hard for transition of its economy from agriculture to industry. The policies of the incumbent government have been instrumental in bringing about basic structural changes in the social and economic milieu of the country. Efforts are being made for requisite sustainable growth in the manufacturing sector and restoration of Macro Economic Stability. The manufacturing sector contributes 17 to 18 % of the total GDP of the country and employee 11.2 % of the labor force. The total target fixed by the government in manufacturing sector in GDP is 24 to 25 % by the year 2010 and per capita income from US $ 450 to 1000.

The surveys to bifurcate small and medium industries have not been carried out in Pakistan, therefore only joint figures of the small and medium industries are available. The small and medium enterprises form the backbone of any economy in the world and play key role in the successful economic growth. Hence all countries are focusing their special emphasis for the development of their small industries. In Pakistan the large enterprises were considered as the real force for the growth of the economy, hence the small industries remained neglected. Despite their problems the Small and Medium Enterprises contribute over 90% of business in Pakistan and provide employment to 83% of the work force in the manufacturing sector. They contribute over 30% to GDP and are generating one fourth of the manufacturing sector's export earnings. They are big source for generating self-employment in the country and substantiating the family's income. Small industries, the key drivers for value-added exporters are important for being biggest source of low cost employment, for helping in regional and local development, in achievement of fair and equitable distribution of wealth, employment opportunity provider to women, assist in fostering a self-help and entrepreneurial culture in the country.

There is no single definition of small industries in Pakistan. The Federal Bureau of Statistics (FBS) implicitly uses the limit of 10 employees for small industries. The State Bank of Pakistan considers an establishment as small if its employees are less than 100 people or the value of its assets is less than Rs. 20 million. The Small and Medium Enterprises Authority (SMEDA) defines the small industry, which employees 10 to 35 persons and its production assets are between Rs 2 million to Rs 20 million. Thus presently the industry having 2 million to 20 million assets is defined as small industry.

Technological or managerial economies of scale may permit large-scale enterprises to operate with lower production costs then the small industries. These industries lack the research capacity, the ability to take substantial risks or any other advantage of expansion such as entering a new market, which requires well-developed sales capacity. The role of small industries at economy wide level is very important. The International Labor Organization (ILO) in its Kenya report has argued for a number of special measures for the growth of small industries and removal of restrictive public policies. India has gone so far as to reserve certain branches of industry for small producers, India has also supported the small industries by taking certain measures like better access to credit, greater availability of services so that the small industries may enhance managerial capacity and upgrade operational technology and improvements in the input and output markets.

The products of SMES tend to originate from indigenous craft traditions and they satisfy the need of poor people comparatively being cheap than the products of the large enterprises as well as foreign technology. One of the examples is that a ceiling fan manufactured in Pakistan with indigenous raw material and technology and another manufactured with imported raw material and foreign technology by the same manufacturing company costs double the price than the local ceiling fan. Thus the small industry is a source of cheaper products than the large enterprises. Moreover the small industries can manufacture

smaller quantities where as the large enterprises cannot go in it otherwise their cost of production enhances. Small industries are also the source of preservation of local handicrafts being capable of such necessary skills and styles of the production of those handicrafts. For example the artisans of Multan (Pakistan), produces very good table lamps and other handicrafts from the camel leather.

The majority of small industries utilize local raw material for the products as well as local machinery, are source of saving the foreign exchange. In addition to that these industries are useful in producing the by products from the waste of large enterprises and can contribute in the GDP of the country. Such waste cannot be utilized by the large enterprises or may not remain economical if used by the large enterprises.

The small industries are the main source of employment than the large enterprises. The small and medium enterprises sector provides 54% of the total employment in the country whereas major share in it is of the small industries (ILO, 2000). These industries provide 83% employment in the manufacturing sector whereas the large-scale enterprises sector provides only 9%. The small and medium industries in nonagricultural sector contribute 44% of the total labor force of Pakistan. The world experience shows that an economical and sustainable source of employment can be generated through development of small and medium enterprises sector. In Japan employment provided by small and medium industries is 81% of the total employment of the country, where as these industries provide 57% of the total employment in USA. The share of employment generated by small industries in manufacturing sector in Pakistan is 83% of the total employment of the country, where as its investment comprise of 15% of the total capital investment in the whole manufacturing sector (Pakistan Economic Survey, 1997-98). It is evident that the small industries generate more employments with less investment. The economic survey of 1985-86 published by the government of Pakistan stipulates that creation of one job in the large scale manufacturing sector cost 80 times more than in the small scale sector. Thus more investment in the small industries is better source of creation of more employment opportunities in the country.

The small industries are good source of foreign exchange earning especially of its wooden, metal and embroidery handicrafts, which have, attain a special significance in the international markets. The share of SMEs is 26% of the total exports of Pakistan (Pakistan Economic Survey, 1997). It is increasing day by day and there are ample opportunities in the world market to export the products of the small industries.

The gainful employment of labor in the village in small industries reduces their migration to cities. They are the main sources of provision of employment opportunities to the rural population otherwise unemployed rural population would migrate to the cities for obtaining employment. The influx of the rural population is enhancing the civic problems of urban areas. Thus the small industries being labor intensive are the only source of reducing the rural migration to the urban areas.

Small industries provide an ample and valuable opportunity for earning income and personal development to women especially in rural areas. Female owned tradition enterprises has a long history in many parts of the world such as West Africa etc but female owned traditional enterprises, like apparel industry, knitting, embroidery, carpet weaving and other such handicrafts have long history in Pakistan. The small industries are very helpful in creating opportunities for women entrepreneurs as well as artisans and workers to develop their faculties fully in garments, hosiery, and embroidery and knitting industries. Since these industries can be established with small amount and limited employees, therefore these are easy to manage. Moreover the women entrepreneurs and workers can exclusively run these industries.

The use of embroidered badges is increasing in USA and Europe day by day and they are discarding the metal badges. To meet this huge requirement, those countries are dependent

on such countries where there is expertise in embroidery work. Few firms of Islamabad, Sialkot and Lahore by employing women workers are engaged in the business of producing embroidered badges for USA and Europe. It reflects that small industries in Pakistan are conducive for entrepreneurship opportunities for women as well as provision of employment to women. The small industries can be easily managed and do not require highly formalized management structures. Scarcity of managers can pose serious constraint on economic development. Managers are vital for the management, operation and successful functioning of any enterprise. The small industries are informal in nature can be easily managed by the owners themselves. Moreover the small industries can be managed by employing part time managers even.

The small industries play a vital role in the balanced growth of economy in the developing countries. The large enterprises are installed in the urban areas owning to certain managerial constraints or installed in the industrial clusters where as the small industries can be installed in the rural areas or remote / far furlong areas. Thus these industries are sources for development / provision of balance economic growth in the countries. The regional disparity can be reduced through the small industries.

The business which emphasizes more in creation of capital plays important role in the economy of any country. The capital mobilization is a very positive step towards economic development. Most of the owners of the small industries utilize their own or friends or relatives savings for the installation of their industries. This act of their, is good source in mobilization of capital. The large-scale industries are mostly installed by borrowing loans. Incase the small industry's owners do not utilize these savings in the small industries these savings would remain unutilized. Thus the capital in shape of saving would remain stagnant, which is not healthy sign for the economy of the country, Therefore the small industries play an important role in the mobilization of the capital of country.

International and Regional Scenario for Small Industries

The small industries are an integral part of economic lifeline of most countries around the world. They are a major source of ideas and employment. They both sustain and stimulate the growth of industrial sector. Though these small enterprises are full of enthusiasm but also fail owing to their inexperience, lack of finances and management skill. The multinationals of the world are endeavoring to make their ingresses all over the world. It is apprehended that these small industries may not be overshadowed under the multinationals. Despite the efforts of multinationals to capture the world industry, the importance of small industries cannot be ignored. They can benefit by the disciplined approach to direct settings, which harnesses their character sense of enterprise, their capabilities and potentialities to their provision of goods and services.

The small industries are vital for world prosperity, job creations and creation of wealth. The small and medium industries according to an estimate are capable of creating almost one billion new jobs in the world, which it will need in the near future. In the developed countries these industries have constituted a significant portion of Gross Domestic Product (GDP) varying from 90% - 58% and provided ranging between 55% to 80% jobs of the total employment in Western Europe, USA and Japan (World Bank, 1997). These industries feed to automobile industries in Japan and other countries of the world at lower cost.

Bangladesh Experience under Special Credit Program

In Bangladesh small industry is currently defined as an industrial undertaking either in manufacturing process or service activity within a total investment of Bangladeshi TK 1.5 Million and the investment in machinery and equipment not exceeding Bangladesh TK 1.5 Million excluding taxes and duties. The Tangail Saree Technology was successfully transferred to west Bengal due to migration of a number of weavers from Tangail to West Bengal, where they established a new enterprise.

Bangladesh Tobacco Co. Ltd. Successfully transferred the technology of wrapping a "birri" by cigarette paper to small sector. Other examples include the Bengal Chemical and Pharmaceutical works founded by Captain Dr. Dutta. Such manufacturers of chemicals have promoted the transfer of technology to the small sector in Bangladesh through provision of employment opportunities and investments.

The Government of Bangladesh had taken up different financial assistance programs with a view to extending financial assistance to small industries at favorable terms and conditions. The Special Credit Program (SCP) was initiated by the Bangladesh Bank in 1978 to disburse local currency loans and working capital to small and cottage industries. Bangladesh Small and Cottage Industries Corporation (BSCIC) monitor the credit program and the interest rate is 10% for the capital as well as working finance. A debt equity ratio of 80% and 20% is maintained for the small as well as cottage industry. The capital finance is directly given to the supplier of the machinery and working capital to the entrepreneur. The finalization of loan period is 2 months. This disbursement procedure helps to check diversion of fund and investment is gainful in short term. The small and cottage industries are flourishing in Bangladesh.

Development Strategy of Small Industries in China

The small industries have played very important role in the economic development of China. At present there are more than 10 million small and medium enterprises registered in the Bureau of Industrial and Commercial Administration, comprising 99% of the total number of enterprises in China (Report by World Bank, 1997). SMEs contributed 60% of industrial output volume and 40% of the total taxes and profits realized by enterprises in china. In the annual export value of US $ 150 billion of the country, SME'S contribution is 60%. The SME'S provides 75% employments to the total TOWNSHIP and Urban employment of China after the reforms and opening the country to outside world. Moreover the SMES has forcefully supported the continuous development of national economy of China and 76.6% of the newly increased industrial output value was created by then since 1990. Thus the SMES play a vital role in releasing the employment pressure and maintaining social stability in China.

The State Owned SME'S in China have started their restructuring in accordance with the requirement of market economy to overcome the accumulative problems of the post-planned economic system. The Chinese government has established a Small and Medium Enterprise Department in the State Economics and Trade Commission in 1998 whose mandate is solely small and medium enterprises. The focus of study of this department is on SME supporting policy, functions of micro control and administration of SME development, guiding the restructuring and promoting of supporting service system for SME'S. Another organization China Industrial Corporation Association of SMES was established in 1990, which actually worked in 15 countries including Japan, Korea, Germany, France, Italy and USA. This agency was set up to promote international cooperation between Chinese and

foreign small and medium enterprises through exhibitions, trade talks, seminars and business visits.

The People's Bank of China declared that the loan service of urban commercial banks and townships and urban credit cooperatives should focus on SME'S. All the commercial banks in China have set up their own SME loans and credit developments under the directions of People's Bank of China. The financial institutions have started supporting the development of SME'S. China has also decided to facilitate Science and Technology Parks and established SME incubators to promote technology transfer.

The Chinese Government is mobilizing various social sectors to engage in the supporting and promotion of SMES service system under the macro administration and policy guidance. The government has also proposed to set up a SME fund for which an administrative committee has been framed to stimulate the regulations for management utilization and supervision of the funds. The government has focused four kinds of SMES i.e. Scientific and Technical SMES, Labor Intensive, having market demand at home or abroad and serving large enterprises.

The Japan & South Korea also attach lot of importance to the Small & Medium Enterprises. Japan provides 50% credit loan facility of the total credit loan of the country to SME'S & these industries imply 81% labor force of the country. The contribution of SME'S in the GDP of Japan is 53% & in it's total export is 38% (SMEDA, 1999). The South Korea has allocated 47% share in credit loan of the total loan of the country to SME'S & these SME'S contribute 20% in the total exports of South Korea. Moreover the SME'S generate 63% employment opportunities in the total work force of South Korea. In India the SME'S employ 57%, in Indonesia they employ 60% & in USA they employ 63% of the work force.

Small Industries in Pakistan

The history of small industries in Pakistan is not very old because very small number of industry came in the share of Pakistan after it's independence in 1947.The areas, which formed the part of Pakistan, were already backwards as compared to the areas, which formed the part of India. Three textile mills and insignificant manufacturing units were installed in the areas of Pakistan before the partition of Sub-continent. The government of Pakistan had very meager resources, which were not even sufficient to pay the salaries of its employees.

After its consolidation the government focused its attention on the industrialization process, which was accelerated during President Field Marshal Mohammad Ayub's regime. The preferential treatment was given to the large scale manufacturing instead of small-scale industries. The big industrialists had every access to the cheap credit and foreign exchange from the banks, whereas the small industries had no such facilities nor they could influence any policy favorable to them. For promotion of small industries in the country the government had set up the National Small Industries Corporation in 1956, which was later on merged with Pakistan Industrial Development Corporation in 1965. The performance of the NSIC can be very well judged from the growth rate of small-scale industries in the country, which was 2% only in sixties. After the separation of East Pakistan the NSIC was dissolved in 1972 & Provincial Small Industries Corporations / Departments were set up in all the four provinces. These organizations supposed to provide advisory services, assist in obtaining credit and provide training and common facilities for establishing the small industries in their respected provinces for selected industries like metal, leather, ceramics, woodworking, pottery, cutlery, small tools and textiles.

The government of Pakistan kept on focusing its attention on large scale industries which became the cause of the growth of small scale industries in seventies. The important feature of Pakistan's economic development since 1950 was the high rate of growth of the

large and medium scale manufacturing. During the first half of fifties the growth rate was 25% per annum, which deceased to 8% per annum in the second half. The growth rate of LSE again accelerated in sixties, which was 17% per annum in the first half and decreased to 10% per annum in the second half. Embolden by this growth rate, Mr. Zulfiqar Ali Bhutto, nationalized most of the large-scale industries of Pakistan. This nationalization scared the industrialists and they preferred setting up of a small-scale industry in apprehension of nationalization of large scale. Moreover the large inflow of remittances from Pakistani workers abroad to the tune of US\$ 2 to 3 billion annually in seventies and early eighties created large market for a variety of consumer durables, produced by the small industry sector. Thus the growth rate of small industries in 70s increased up to 27.5% per annum.

The government of Pakistan realizing the importance of the small industries while formulating the industrial policy statement in June 1984 emphasized on the importance of small industries for the economic growth and employment generation. The unit involving fixed capital investment of up to 10 million was defined as a small industry. Major measures include provision of timely credit; opening new and strengthening existing training facilities; development of specific programs for marketing of small unit products; were enunciated for the development of small industries in the country:

The government except announcing above mentioned policy guidelines practically did nothing for the uplift of small industries. The Small Business Finance Corporation (SBFC) could have effectively chalked out any program for the growth of small industries but its performance was not satisfactory. There was only one Development Financial Institution (FDI) i.e. SBFC for the financial assistance to small industries, whereas there were so many DFI'S for provision of financial assistance to large-scale industries. The SBFC became politicized and corruption remained rampant in it from end of eighties. The Small Industries Corporation functioning in the provinces also remained inefficient in devising effective policies for the small industries owing to paucity of funds. Thus the small and medium industrial sector could not grow more than 8.4% in eighties and further declined to 5.7% in nineties.

The Government of Pakistan again realizing the importance of SME and needs to provide a focal institution for them, in October 1998 established the small and Medium Enterprise Development Authority (SMEDA) at federal level. The primary objective of SMEDA is to provide a fresh impetus to Pakistan economy through launching aggressive SME support programs. The major role of the SMEDA in financing SME'S is recommendatory. The SMEDA would provide the knowledge to the potential entrepreneur regarding opportunities in different market segments and would help in choosing the project at reduced risk level. Once the potential entrepreneur chooses the project, SMEDA after screening the SME project will recommend the project to the banking community. Moreover the SMEDA will also provide marketing information's to the entrepreneurs as well as trade leads and references to approach these trade links. It will also provide information to the entrepreneurs on the field of export as well as explore the international markets for consumption of the merchandised manufactured by the small and medium industrial sector.

The government in the past as well as present is concentrating on the development/growth of large-scale enterprises. Most of the economists of the country and policy makers consider that large-scale manufacturing is essential for development of the economy. The formation of SMEDA is also mere consolation and may not be able to play any significant role in the growth of small industries in the country because they are located in Lahore and it is difficult for entrepreneurs of other parts of the country to approach them.

According to Pakistan Economic Survey, 2004-05, the Small and Medium Enterprises (SME) represents a signifying component of Pakistan's economy in terms of value. They are highly labor intensive and provide employment to the bulk of the non-agricultural labor

force. The growth of SMEs has mainly been hampered by the non-availability of credit in past. Realizing this constraint the government has opened two specialized non-credit banks, namely, the "SME Bank" and "Khushali Bank". The Small and Medium Enterprises Development Authority (SMEDA) is also actively developing programs for managerial skill development and technical and informative support to the SMEs.

The SME Bank was established on 1st January 2002 with the primary objective of providing financial assistance and business support to small and medium enterprises. A large number of SMEs are being financed under its program lending scheme namely "Hunarmand Pakistan Scheme" in such businesses as fan manufacturing, cutlery manufacturing, surgical instruments, doctors and dentists clinic, women entrepreneurs, CNG stations, auto looms, auto parts manufacturing, furniture manufacturing, motorcycle rickshaws etc. Up to 31st January 2005 the SME Bank financed 4522 SMEs and disbursed loans amounting to Rs. 3031.57 million and has been successful in creating 9044 employment opportunities in the country. Realizing the importance of microfinance in improving the lives of the poor people, the government has established Khushhali Bank in 2000 – a microfinance institution – under a public-private partnership program. It has also encouraged private sector to setup microfinance banks in Pakistan. So far three microfinance banks have become operational during 2001-04. The Khushhali Bank alone has so far disbursed Rs.4.5 billion and nearly 33 percent of its clients are women. The services of these institutions will be the most effective instruments in improving the lives of the poor people in both urban and rural areas.

Discussion

The concept of supporting small industries in Pakistan could not get support from the government quarters and real engine for the economy were considered to be the large enterprises with the concept of import-substitution. The small industries grew at their own in the country without government planning. Majority of the industries are family owned in which few persons have been employed. The agro based small industries are setup in the rural areas and remaining is in the urban areas. These small industries covers most of the industrial field out of those the prominent are light engineering, textile, garments, knitting, surgical, sports goods, hosiery, embroidery, leather goods, poultry, handicrafts, agriculture, woodwork, nursery, fisheries, lodging industries etc. The small industries sector is facing the following problems:

The small entrepreneurs face difficulties in obtaining loans for the small industries. Moreover, the laid down procedures for obtaining loans are cumbersome which discourage the small industries & DFIs. The other problem is additional security. The small business finance corporation or small industries corporation which extending loan requires additional security equal to the amount of loan beside 40% contribution of the entrepreneur in that venture. The above condition is only for the small business where as the large scale enterprises are exempt from the condition of additional security. Moreover the interest rate for large and small-scale industries differs the large-scale industries obtain loan at the interest rate of 10% whereas the small scales are given the loan at rate of 15% or above.

The small industries lack the quality of their products. Majority of them neither apply nor can afford to apply the modern methods in their production owing to lack of funds. Their machinery and techniques are old, which deprive them from getting proper price of their products in the market. The size of industry itself restrains these industries from the access of modern technology. The entrepreneurs in different sectors of small industries are semi skilled who have acquired the knowledge of their industries either from their ancestors or from semi skilled technicians working in their own industry or these entrepreneurs had been working

with some other entrepreneur. Majority of these industries are still applying the obsolete technology etc.

The small industries are deprived from the research and development facilities. Owing to their meager resources and small size, these industries can not incur expenditures on research and development. Thus they can hardly innovate the products. Since this sector has remained neglected, therefore no such facility is provided to these industries from government side. Few institutions established by the government in the sectors of pottery and steel products are situated near one cluster of industry i.e. Gujrat, Gujranwala and Sialkot. The remaining parts of the country cannot take benefit from these institutions. The new sector of information and technology is still in developing stage, no efforts are being made to create awareness of the small businesses towards this sector. This deprivation of research and development facilities is one of the main problems of small industries. All those entrepreneurs who are engaged in production of conventional goods may be attracted to shift towards the value added products.

The small industries are being operated in informal sectors. The entrepreneurs of these industries are mostly depending on domestic markets to merchandize their goods. They are unaware of the international markets. They can earn more if they send their goods to international markets where there is a demand for their goods. Their ignorance about the markets is also a big problem. The labor employed by these industries is mostly unskilled or semiskilled. It hampers the quality production. Most of the skilled / qualified labor likes to move in the large-scale industries, though the government has established some training institutions but they are inadequate. This problem also deserves the attention to be resolved.

These industries are very important for the growth of national economy, for creation of new jobs for the 140 million populations of the country, which is growing at the rate of 2.1% per annum which touched to 3% per annum previously (ILO Report, 2000). These industries play a vital role in preventing the migration of rural population to the urban areas. Unfortunately these industries could not get proper attention from government quarters and instead these industries all the facilities were provided to the large-scale industries. Keeping in view the importance of these industries and their role in the national economy they deserve more attention

The share of small and medium enterprises in credit facilities from DFI'S is 10% in Pakistan, where as the share of large scale enterprises are 88%. The share of small industries out of 10% is very less because more share goes to medium industries. Most of the countries of the world are paying more attention to their small and medium industries. India has allocated 16%, Indonesia 23%, USA 43%, South Korea 47% and Japan 50% credit of the total credit provided by DFI'S to their small and medium enterprises. Where as very meager share is allocated by Pakistan (General Characteristics of SME'S, 1999). The formation of SMEDA in addition to the provincial small industries corporation / departments and setting up of small and medium enterprises bank with in the small business finance corporation will not help much until and unless reasonable credit share is not increased.

The small industries are considered high-risk ventures by the banks therefore they hesitate in extending loan to them. The bankers also lack training and experience in evaluation of small projects, which is called absence of credit technology. To overcome this problem the State Bank of Pakistan should come forward and direct the commercial banks and DFI'S to impart training for evaluation of small projects to that staff which is ear marked for the small industries. Moreover the major sectors of small industries may be defined.

The SMEDA authorities stated that they have carried out the study of Fisheries Sector, Dairy Farm Sector & Beef Fattening sector. They have been able to project the strengths & weaknesses of these sectors to the commercial banks. Some of the commercial banks finding lots of potential in these sectors have agreed to invest billions of rupees in these three sectors.

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SMEDA is required to give publicity to this information because so far majority of small entrepreneurs being ignorant of this information are not approaching the commercial banks for financial assistance in their business. The State Bank of Pakistan should instruct those commercial banks, which are willing to invest in these sectors, should also widely publicize the policy for the benefit of small entrepreneurs. SMEDA should also undertake the study of other important sectors of small industries to facilitate the work of the commercial banks beside the above-mentioned Sectors.

The majority of small industries established in the rural areas are agro based. These industries are very important in prevention of migration of the population from rural to urban areas. These industries after the agriculture sector are the only sources of provision of employment to rural population. The Agriculture Development Bank of Pakistan (ADBP) was set up to promote the agriculture and agro based industries. The performance of the ADBP remained very demoralizing. Keeping in view the role of the agro based small industries in growth of GDP, sources of employment in the rural areas / backward areas and helpful in prevention of migration of rural population to urban areas, there is a dire need of re-structuring the ADBP, in line with the Grameen Bank of Bangla Desh.

The marketing is another main problem of the small industries. The small entrepreneurs are not much aware about the domestic as well as international markets. Most of the entrepreneurs merchandise their goods in those markets, which are in close proximity to their industries. They also lack resources to dispatch their goods to the far furlong markets or big cities for marketing. Government has to devise some system where the small industrialists are kept informed about the domestic markets as well as the international markets. Grameen Bank extend the loan to a community under the poverty alleviation program. The bank keeps on monitoring the project till final finished goods and then arranges the marketing of whole community under its own supervision. The revenues are deposited in the bank and then reutilized for the production.

The Government of Pakistan has also taken a positive step in this direction to assign the responsibility for provision of marketing information to the entrepreneurs by SMEDA. Though this is a positive step but an authority having its head office in Lahore cannot meet country wise requirements. Moreover it would provide information to the persons who make a visit to its office. How can we expect that small entrepreneurs of Bahawalpur, RahimyarKhan, Sukkur or Multan would come to Lahore to seek information about market? The Government & SMEDA should establish the SMEDA'S centers in the industrial clusters and rural areas by giving wide publicity.

Pakistan produces 10% of the total world cotton & its share is 1.8% in the total US $365 billion Global Textile Market. Presently Pakistan's major textile items are its raw cotton, cotton yarn & 0.97% apparels. The Government of Pakistan, SMEDA & other agencies involved in the promotion of exports should attract the small entrepreneurs to invest in garments & knitting industry as well as other value-added items of textile sector. The NGO'S can also play important role in setting up the training institutions for training the textile labor. It would not only promote the exports of the country but would also help in creation of more employment opportunities in the country. The handicrafts of Pakistan are popular in Europe and America. The SMEDA should study the other world markets where the handicrafts of the Pakistan could be sold and accordingly create market awareness among the entrepreneur.

The women entrepreneur in the rural areas may be encouraged to set up Garments and embroidery industries. An organization like Grameen Bank of Bangladesh may be created which should act as middleman between the entrepreneur and market. That organization should take orders of embroidery goods and cloths badges etc from foreign countries and accordingly get these orders executed through industries set up by the women. There is big

world market, which is required to be explored for sale of our handicrafts, garments and embroidery articles.

The formation of SMEDA is a positive step towards the development of small industries but role allocated to it is required to be further enhanced to the status of DFI. Presently the SMEDA cannot play an effective role to deal the small industries in the country which are more than 12000 in the province of Punjab only. The offices / branches of SMEDA should be established countrywide in far flung areas where professional bankers should deal with the small investors. In this way SMEDA can play an effective role in the development of small industries.

Conclusion

The small industries play a major role in the growth of the GDP of the country and a big source provision of employment in the country. These industries are not only source of creating job opportunities in the rural areas but also stop the migration of population from rural areas to the urban areas. These industries are less capital intensive and more labor intensive, therefore are conducive in creating employment opportunities as compared to the large-scale enterprises. The small industries are very good source for provision of jobs to women's. The women entrepreneurs can also display their skills in these industries. These industries were ignored in the past and preference was given to the large-scale enterprises by the government as well as by the banks and other development financing institutions. These industries self grew at the rate of 8% per annum where as the growth of LSE's remained at an average 4.7% during the first half of 1990's and 2.5% during the second half of 1990's. Recently the growth of LSE'S has declined to 0.7% negative. Pakistan is developing country having population 140 million which is increasing at the rate of 2.1% per annum. According to the latest estimates the urban population was 32% while the rural population was 68%. According to the latest estimates literacy rate for male was 48.9% and for female was 23.5%. In the urban areas the literacy rate was 57% and rural areas 27.5%.

The government has not given any attention towards the agriculture and small industries, which are mostly agro based in the rural areas. This has created adverse effect on the agriculture sector & its GDP has fallen from 53% in 1950 to 23% in 1977. Thus government ambivalence towards development of rural areas has increased poverty and illiteracy in the rural areas. The rural population is forced to migrate to urban areas for seeking employment. This influx of rural population to the urban areas is creating so many administrative and social problems. To avoid these problems it is imperative to contain the migration of rural population by means of providing employment to them near their dwellings. This target can only be achieved through setting up the small industries or agro-based industries in the rural areas. The reliance of development of economy is being placed on the large-scale enterprises. As per figures given in the above discussion, the growth of large scale enterprises is negative and their viability is in question owing to their higher administrative and maintenance costs. The majority of public sector large-scale enterprises are running into loss. Most of the private sector LSE's (large sector enterprise) are also at the verge of collapse owing to recession in the world market. The LSE'S every now and then request the government for subsides or concessions in the taxes. On the other hand the small and medium industries are not only growing in this recession but also contributing in the growth of GDP. The small and medium enterprises got very less credit facilities from the government, banks and other DFI'S, therefore they developed them selves by their own resources or by taking help from the relatives and friends. Most of the industries are operating with the old machinery and technology. The labor force they are employing is either unskilled or semiskilled. There is need to extend financial assistance to those industrialists which are

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using old machinery so that they may replace it with modern technology. There is also a need that the government as a venture should set up vocational institutes in the clusters of small industries so that skilled man power may be available to them.

The focus should be on setting up export oriented and value added small industries so that foreign exchange may be earned through these industries. The small industries can be utilized for producing the raw material for the large-scale industries as well as vise versa to utilize the waste of large industries. The light Engineering sector of small industries can prove to be very useful for the deletion program of government in the automobile industries.

The government should pay more attention to develop the small industrial sector by extending more financial assistance so that these industries may be able to grow in the rural and backward areas. It will help in distribution of wealth in the backward and deprived areas. These industries would be helpful in contributing the growth of GDP, which has fallen to 3.2% in 1990's from 6.4% in 1980's. These will promote our exports as well as create employment opportunities for the fast growing population of the country.

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Competitiveness of Turkish Automotive Industry: A Comperison with European Union Countries

Selahattin Bekmez
Muğla University

Murat Komut
Muğla University

Economic relations and competition process between the EU and Turkey has been increasingly accelerated with the customs union agreement in 1996. Consequently, this acceleration process has affected the industrial sector generally, as well as automotive sector, specifically. Since Turkey's joining to the EU will create even more crucial results in international markets for specific sector, the impacts of the process should carefully be evaluated beforehand so that the necessary precautions must be taken by the sector representatives. Even though above statement is true for every individual sector, this study covers only Turkish automotive sector and its competitiveness within the EU process. Also, automotive sector has its own special characteristics, because it can be considered a locomotive for most of the remaining sectors in Turkey.

Within this context, this study measures the competitiveness of Turkish automotive industry and compares the results with those of the EU member countries from 1995 to 2004. As measurement tool, we use Revealed Comparative Advantage Indexes of all the countries. In addition, a simple Least Square Regression technique has been used to show how and in what ratio exports are affected from several variables. In order for our analysis become more meaningful and applicable to the real sector, a small survey has been done to some of the automotive producers in Turkey. Even though the sampling of the survey was not statistically enough to reach certain conclusions, the results obtained from the survey helped us to construct the econometric model on more concrete bases.

Results of the study showed that Turkish automotive sector has competitiveness problem with the EU. However, the medium and big size producers have more power to compete with the EU countries. Also, even though Turkey has the highest tax on automobile industry in the Europe, the sector showed very high productivity level after the customs union agreement in 1996.

Introduction

Liberalization efforts in trade and production, increased capital mobility, rapid developments in technology, and tendency of globalization in the world created inevitable competitiveness among the sectors. This competitiveness is not just in price level, however. It includes all kinds of competitions such as quality competition, on time delivery competition, and widespread service center competition, etc. In order for a firm or sector to be competitive in the world, it has to compete with the world within all the above mentioned areas.

Such developments in the world economies affected the Turkish economy as well. Since January 24, 1980 liberalization and stabilization decisions of the government started gradual but crutial effects on Turkish economy. These basic, but gradual impacts became even more powerful with the financial liberalizations and capital mobility decisions made in August 1989. Finally, customs union with the EU signed in January 01, 1996 created very serious and distractive competition effects on the sectors in both national and international bases. As a result some of the sectors in Turkey become more delicate and faced uncertain and unwanted results. Firms stared investing more in information technology and making projections for future.

Within this context, competition power defined as the comparative or absolute advantage of a firm or sector in production level, profit rate, design, credibility, on time delivery and price and/or quality. Competition power can be expressed as nationally as well as internationally. If it is considered internationally it may be deducted into the following items:

1. Selling goods and service to foreign countries and achieving to the foreign trade balance
2. Increasing income and employment level as well as creating acceptable and contunious improvements in living standards
3. improving the ability to receive more shares from international markets(Aktan, 2003)

Importance of Automotive Sector in the Turkish Economy

Automotive sector is one of the leading sectors in all developed and developing countries, because the sector has very important relations with all the other sectors of the economy. For instance, automotive sector is the main buyer of iron-steel sector, non-heavy materials sector, petrolium and chemical products sector. As a result, the technological developments in automotive sector force other sectors to show parellel technological developments. In addition, some sectors such as tourism, infrastracture and construction, agriculture, and transportation sectors depend on automotive sector for their tranportation related needs. Morover, automotive sector also creates empoyment for even unrelated sectors such as marketing, services, finance and insurance companies, and raw material suppliers, because these supporting sectors play a major role in tranfering the goods and services to the consumers. So, considering all these interconnectedness of the automotive sector and all the other sectors, it is very obvious that any change in the sector will automatically affect the whole economy (Yurdakul and Ic, 2002).

As it is the case for all the countries of the world, the automotive sector has very dynamic process in regards to changes in market and competition conditions in Turkey as well. The sector entered this dynamic process with customs union agreement by passing through several hardships and high technological developments. Overcoming these hardships and adopting newer technologies, the Turkish automotive sector found itself a place and became a part of the global world. Thus, Turkish automotive sector created a new destiny for

itself and became exporter rather than importer. Is this enough, however? As it will be discussed in the following chapters, the sector has a long way to go in order to become really a competitive in the EU and also in global world.

If we look at the dynamic effects of customs union agreement, the Turkish industrial sector has been generally opened to the world competition. As a result of this liberalization process, Turkish automotive sector increased the productivity and quality in order to become competitive in the global world. Within the context briefly discussed above, this study will analyze "the goods" and "the bads" of the Turkish automotive sector, and its place in the competitive world in general; and the sectors' comparative advantages in the Europe. In order to do such an analysis, we discussed the competitiveness of automotive sector of the EU countries first; and then competitiveness of Turkish automotive sector. We used two ways to measure the competitiveness of Turkish automotive sectors: Revealed Comparative Advantages Index and Basic Regression Model. As discussion, results produced by each analysis have been compared within the national and international bases.

Automotive Industry in the European Union

European Union has the largest automotive sector in the world both in terms of production and consumption level. Half of the world exports of the automotive industry are done by the EU alone. Besides, the union is the largest market automotives market for the world. The union makes approximately 40% of the worlds automotive imports. Germany is the biggest automotive producer in the union. France, UK, and Spain follow the Germany in this sector. If foreign investments are also included, Spain produces more in automotive sector. However, most of its production is assembling only.

Cyclical structure of the sector creates above average growth levels during busy times, while well-below average growth rates during recession times of the economy and thus faces very serious financial crises.

Table 1: Place of the EU in the World Trade (Million $)

Years	World Exports	EU Exports	World Imports	EU Imports	Exports (%)	Imports (%)
1995	456.420	235.523	460.780	194.029	0,52	0,42
1996	475.360	250.630	485.929	206.526	0,53	0,43
1997	497.910	247.388	506.197	204.568	0,50	0,40
1998	520.900	271.959	536.102	233.859	0,52	0,44
1999	556.460	274.110	565.907	243.793	0,49	0,43
2000	576.750	270.108	589.235	231.410	0,47	0,39
2001	564.560	275.857	583.151	233.693	0,49	0,40
2002	627.930	308.454	638.203	257.307	0,49	0,40
2003	723.572	371.114	734.646	312.664	0,51	0,43
2004	847.240	470.792	860.017	397.437	0,55	0.46

Source: Calcultated by the authors using WTO statistics

Even though it is not shown in Table 1 above, the sector started slowing down during early 1990s. All the countries in Europe except Germany showed dramatic decreases in automotive industry. These countries waited until 1994 to restructure the industry (Tokatlıoglu, 1997). Actually, the period between 1994 and 2000 can be considered a reconstruction period of the automotive industry in the Europe. Considerably big amount of encouragement founds (about 180 billion dollars) have been supplied to the sector during this period of time. Besides this, voluntary quantity restrictions have been applied for non-customs

union member countries. With these kinds of policies, the union aimed to control imports for certain period of time, create more competition power and increase the market efficiency and human capital in the industry as a whole[1].

Customs Union With the EU and Turkey

Customs union constitutes Turkey's formal partnership relations with the EU. Thus, customs union with the EU is not considered just an economic aspect of the relations, but also, as indicated in Partnership Docunents, is considered as one of the steps for full membership. As customs union agreement became affective with Ankara Treaty signed in January 1st, 1996, the new era has started as indicated item five in the Ankara Treaty. As a matter of fact, the item 28 of the Ankara Treaty indicates that the final aim of customs union is a full membership of Turkey to the European Union.

Customs union can be defined as a type of agreement that includes the removal of all the tariffs and equal effective custom taxes and quantity restrictions, and also appliying the same level of external tariff rates for the non-member countries, which is called Common External Tariff (CET). Under customs union, it is essential that goods and services considered in the agreement must easily circulate among the member countries. For this reason, customs union guarantees the free circulation of the goods and services in order to prevent trade diversion. In order to achieve aimed results, all the common policis must be applied by the member countires.

Effects of Customs Union Agreement on Automotive Industry
Trade Creation Effect

Trade creation effect occurs when a higher cost producer is replaced with a relatively lower cost producer due to customs union. In other words, due to custom related tax and CET a country considered as a high cost producer before the customs union, it becomes a lower cost after the customs union. As a result of such a process, the prices of tradable goods decrease. Also, due to removal of tariffs and quotas among the member countries, consumers and producers obtain their needs with lower costs. When prices (costs) decrease, both producers and consumers demand more goods and services, and thus, the trade among the member countries increases. This process is called trade creation effect of an economic integration.

Some numbers regarding exports and imports between Turkey and the EU are given in the Table 2 below. As it can be seen from the table, trede cereation effect of the customs union started after 1999, even though the agreement has been signed in 1996. This late stimulation of the exports and imports may be due to adaptation process of the industry, or slow changes in the tax laws.

Table 2: Automotive Exports and Imports between Turkey and the EU (Million $)

Years	Export (EX)	Import (IM)	(EX-IM)	(EX+IM)	(EX/IM)
1996	680.229	3410.013	-2729.784	4090.242	0.20
1997	675.361	4639.206	-3963.845	5314.568	0.15
1998	823.214	4641.578	-3818.364	5464.793	0.18
1999	1289.829	3876.449	-2586.619	5166.279	0.33
2000	2146.318	6546.106	-4399.788	8692.425	0.33
2001	2395.204	2156.035	239.169	4551.240	1.11
2002	2772.056	3258.762	-486.705	6030.819	0.85
2003	4019.637	6043.551	-2023.913	10063.188	0.67
2004	6771.411	10023.869	-3252.458	16795.281	0.68

Source: Authors' calculations from the OSD ve WTO statistics

Trade Diversion Effect

Trade diversion effect is also one result of economic integration. Unlike trade creation effect, trade diversion effect results a cost or price increases due to economics integration. In other words, member countries cannot import certain goods and services from a lower cost country, because of high custom tariffs. Instead, however, member countries are obliged to buy form a member county. As a result, member countries must trade with a member country even though it is more expensive. Due to this shift in trade from a non-member country to a member country, the volume of trade within the union increases and also, the volume of trade with non-member countries decrease. Since the customs union diverted the direction of the trade, this process is called "trade diversion effect" of the customs union.

Turkey's most of foreign trade in automotive industry was with the EU even before the customs union agreement. The customs union has affected this trend in some extent. As it is shown in Table 3, Turkey's import from the EU was $3.41billion before the agreement. This amount reached to over $10 billion in 2004. The export side of the table also gives a similar scene. While Turkey's automotive exports to the EU was $680 million before the customs union, this amount reached to over $6.7 billion in 2004. As the remaning parts of the Table 3 indicated, however, imports from and exports to the rest of the world did not increase that much. The table clearly shows that there is a trade diversion from the rest of the world to the EU countries.

Tablo 3: Forign Trade Indicators of Turkey with the Rest of the World (Milyon $)

Years	1996	1997	1998	1999	2000	2001	2002	2003	2004
IMPORTS									
EU	3410	4639	4642	3876	6546	2156	3259	6044	10024
Far-East	648	1270	1270	726	1126	226	327	708	1698
NAFTA	143	165	165	100	105	36	86	106	156
Eastern Europe	62	66	66	78	19	45	70	179	83
EXPORTS									
EU	680	675	823	1290	2146	2395	2772	4020	6771
Far East	5	5	7	4	8	7	5	11	17
NAFTA	51	35	68	57	107	82	109	112	252
Eastern Europe	62	97	72	64	173	215	348	584	472

Source: Authors' calculations from the OSD and WTO statistics

Competition Effect

After the customs union agreement, Turkish producers had more chance to acces into the EU countries. This acces has created even more competition for Turkish automotive industry as well as other industries. In order to prevent monopolistic tendencies in some sectors, the Competition Authority has been formed in Turkey. This authority aims to prevent any kind of monopolistic behaviors in the Turkish economy. Also, with the customs uion and more competitiveness, some firms without cost or price advantage left the market. As a result of this high competition, firms started to produce the goods in which they have comperative advange.

As the Table 4 indicates, medium and big size firms in Turkish automotive industry have more competition power with respect to smaller size firms. Also, efficiency and

production level in Turkish automotive industry has increased after the customs union agreement.

Table 4: Competing Power of Turkish Automotive Industry after the Customs Union

	Small Size		Midium Size		Bigger Size	
	Competition Power (%)	Competition Level	Competition Power (%)	Competition Level	Competition Power (%)	Competition Level
Automotive	32.4	R*	50.3	R	47.5	R

Source: Demir, 1998   * Equal level of competition power

Techniques to Measure Competition Power

Even though, competiton power in a sector can be measured with several ways, and all have different meanings, this study will focus on two methods to measure the competition power of Turkish automotive industry: i) Revealed Comperative Advantages (RCA) and ii) Least SquareS Regression (LSR) Approach. Even though both methods measure similar things, the first method provides information about competition power specifically, while the latter technique determines internal and external variables affecting the competition power. In the second approach, the competition power is measured with export level as dependent varible, which is the most suitable variable to measure competitive power of the industry.

In addition, a survey on some automotive firms has been done in order to give us some idea about the independent variables of our econometric model. We are aware that the number of firms is not sufficient to produce statistical results, but at least, the results gave us some idea in determining the dependent variables of the model. We tried several models to find the best fitted model though.

Application of RCA Approach into Turkish Automotive Industry

This part of the study aims to measure the competition power of Turish automotive industry and compares it with fifteen EU countries first, and the EU as a whole. The index can be calculated as follow:

$$\text{RCA index} = ln\left[\frac{(XI \ / \ XT \ )}{(MI \ \ / \ MT \ \ )} \right]$$

where,

XI: export of country i in good a

XT: total exports made by country i

MI: imports of country i in good a

MT: total imports made by country i

Interpretation of RCA is very important in determing the competition power. So, one must be very careful in interpreting and discussing the results obtained from the RCA index.

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If RCA > 0, it refers that export of automotive industry is greater that that of imports. Also, the bigger is the RCA index level, the greater the competition power is. If RCA > 50, it indicates that competition power in that sector is very high; and if -50 < RCA < 50, it refers that the industry is in the border. In other words, it has very low level of competition with the world (marginal competition power); if RCA < -50, it refers that the competition power of that industry is very low[1]

A Comparison between Turkish and the EU Automotive Sector

Table 5 gives RCA competitiveness power of the Turkish economy with respect to fifeteen EU countries and the EU as a whole. As the table indicates, Turkey is net exporter between 1995 and 2004 when compared with Avustralia, Ireland, Portuqal and Greece. For instance, since there is not much automotive production in Ireland, Turkey's RCA index is very high. However, in 1999, due to economic crisis in Turkey, our RCA index in marginal levels. Danmark and Finland became net automotive exporters after 2001. Remaining countries of the EU are net automotive exporters. Turkey's competition power compared to Belgium-Luxemburg has improved after 2001. The RCA index was in marginal level before, however, after 2001 this index showed some improvements.

When the RCA index of Turkish automotive industry is compared to whole EU, Turkey is net importer, but the situation shows considerable improvements. The index is positive for year 2001 and 2002, but last two years turns to negative. The competition power of Turkey's automotive industry compared to whole EU is not that bad though. It is still in marginal levels.

With the customs union agreement, Turkey has catched an increasing trend for some years, however, for the last two years this trend cannot be continued. For instance, Turkey had 30.71 RCA index in 2001 and 6.41 RCA level in 2002 when compared to Germany. Last two years these numbers decreased to -38.49 in 2002 and -40.77 in 2004, respectively.

Table 5 : Competiteness Measurements of the EU and Turkis Automotive Industry								
Countries	**1995**	**1996**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Holland	-73,06	-199,52	-222,56	-168,74	-11,91	-43,87	-33,11	-2,69
Belgium - Luxemburg[1]	-22	-51,34	-148,76	-148,73	73,08	15,33	35,48	23,02
Italy	-374,99	-372,1	-371,18	-335,05	-240,64	-250,76	-174,12	-139,38
Spain	-75,39	-177,32	-200,16	-191,44	14,06	-50,71	-39,15	-84,26
United Kingdom	-117,29	-120,67	-121,22	-100,71	-8,37	-46,91	-62,87	-11,62
Germany	-93,58	-127,01	-36,07	-38,94	30,71	6,41	-38,49	-40,77
France	-127,88	-61,64	-73,03	-27,18	1,4	-6,41	-27,33	-35,77
Australia	51,47	67,81	36,38	27,21	153,79	93,21	75,94	103,17
Danmark	-45,74	-51,08	-39,45	-3,64	227,18	38,43	219,68	306,92
Finland	-64,08	-59,77	-140,38	-130,44	153,29	183,79	294,17	184,12
Sweden	-215,98	-140,14	-76,35	-113,98	-31,56	-13,77	-6,27	7,43
Portuqal	173,16	162,63	186,03	153,3	354,14	272,55	305,29	244,19
Greece	466,35	276,66	302,13	435,03	564,56	501,51	592,65	615,42
Ireland	426,18	258,87	-53,09	164,86	482,44	463,9	444,03	294,41
EU	-82,24	-91,78	-70,09	-50,87	23,11	7,21	-14,14	-12,88

Source: Authors' calculations from the OSD and WTO statistics

If the individual EU countries are compared to the whole world, only Germany's competition index is in good standing. The remaining countries are either in bad condition or in marginal RCA levels. Table 6 shows these facts in detailed way.

Tablo 6: Competition Power of Turkish and the EU Automotive Industries within the World

Countries	1995	1996	1997	1998	1999	2000	2001	2002	2003
Turkey	-42,5	-52,6	-100,1	-84,7	-49,1	-25,3	57,9	45,7	19,7
EU	17,8	16,8	16,6	14,1	12,8	19,2	18,4	18	17,8
Holland	-49,7	-51	-46,8	-45,7	-45,7	-42,4	-47,6	-41,5	-47,1
Belgium-Luxemburg	29,7	25,5	13,6	7	3,4	8	16,5	25,4	27,2
Italy	-15,1	-25,3	-37,2	-39,9	-43,8	-32,6	-41,3	-48,5	-45
Spain	49,7	46,6	43,9	36,9	27,7	35,9	34,6	32,6	32,1
United Kingdom	-23,8	-20,4	-23,2	-22,5	-23,1	-15,5	-36,5	-27,9	-27,7
Germany	52,6	49,1	53,2	57,7	55,8	66,4	63,3	58,8	58
France	14,9	15,6	32,7	26,4	23,3	29,5	29,8	30,8	32,1

Least Squares Regression Approach

This part of the study aims to find various factors that effect sustainable competitiveness power of Turkish automotive industry. Data is collected from Central Bank of Republic of Turkey (CBRT), WTO, Turkish Institute of Statistics and Automotive Industry Association. In order to find better results we used quarterly data from 1989 to 2004. The LIMDEP software has been used as statistical package.

The variables of the model can be chosen from the followings:

Exports: Export of Turkish automotive industry has been considered as dependent variable of the model, since it measures the competitiveness power of the sector. The magnitudes are not in quantity, but it is terms of dollar value of Turkish automotive sector.

Real Exchange Rate: In international trade, the cost of a good or services is very important in order for that country to become an importer and/or exporter. Also, when it comes to competitiveness power calcultations this factor becomes very essential for the econometric models, since it affects relative purchasing power for both producers and consumers.

Productivity: Productivity is also very important for the model since it affects real profits. Profits increases with an increase productivity.

Imports: Expected sign of imports is negative. Since the more a country imports, the lower its competitiveness power will be. The survey results done for this study also show that domestic pressures create negative effects on Turkish automotive industry

Capacity Use Ratio (CUR): Due to unsatisfactory domectic demand, the capacity use ratio is low in Turkish automotive industry. For that reasons, in some periods, sudden increases in demand cannot be satisfied. This fact, however, has changed in some degree in last years. Capacity use ratio is increasing for almost all automotive producers. We expect the relationship between exports and capacity use ratio is negative. This seems to have theoretically reverse affects on exports, but it is a very good policy instrument for the firms in competitiveness.

$$X = f (RDK, V, RK, M)$$

$$X = 0,185324943\ RDK\ -\ 0,104544127\ V + 0,469211481\ RK + 0,456713477\ M$$

where,

X: Exports

RK: Real Profits

RDK: Real Exchange Rate

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V: Productivity

M: Imports

As shown in the Tables below R² value is (% 94) and independent variable explains the exports very well. Durbin Watson value is 2.36, which indicate that there is no autocorrelation among independent variables. F value is 365.9. The probability statistics show that the results are signiffican in 0.05% level.

Table 8: Least Squares Regression Results - 1

Variables	Coefficient	Standart hata	t value	$|P[|T|>t]$
Real Profits	0,469211481	0,19323026	2,428	0,0182
Real Exchange Rate	-0,185324943	0,1921773	0,964	0,3387

Table 7: Least Squares Regression Results - 2

Dependent Variable	Export Mean		94,78
Mean Squares			33,48
Sum of Error Squars			67217,05
R²			0,94
F statistics	[3, 60]		365,9
Durbin Watson			2,36
Productivity	0,104544127	0,15459249	-0,676	0,5015
Imports	0,456713477	0,11052929	4,132	0,0001

Results

The study aimed to compare the competitiveness of Turkish automotive sector within the EU and whole world. In order to make this comparison we used RCA index. The results showed that RCA index of Turkish automotive industry shows very high improvements even though last two years the index is lessend in some extent. With this good improvement however, the sector still has some problems to be dealth with. For instance, the government should take long lasting macroeconomic policy precautions and apply them in a stable way.

The results of the study show that even though the customs union brought considerable improvements to Turkish automotive sector, the sector still needs long way to go. Also, the sector needs more efficient production and cost related precautions in order to comptete with the EU countries and the whole world.

The results of our study migh include some biasness due to the survey with unsufficient number of firms. Thus, one must be very cautious when using the results obtained.

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Identifying the Role of Education in Socio-Economic Development[18]

Francesco Burchi
University of Roma Tre

Food insecurity and illiteracy involve more than **800 million** people today. In the proposed paper, I argue that education is a fundamental factor in achieving food security for rural populations in developing countries. I base my arguments on the Human Development Approach, according to which, education is both intrinsically and instrumentally relevant for education. In this paper I focus on the instrumental role of education for food security, by posing the question: *Is education, both basic and higher, an essential tool to fight against food insecurity in the rural areas of developing countries?*

I answer this question by examining the theoretical and empirical causalities between the two variables: education and food security.

Traditional Economic theories developed since the 1960s within the endogenous growth theory promoted the concept of *human capital*, according to which education is considered as a means to ensure economic growth. On the contrary, following Amartya Sen's *human development* paradigm*,* I argue that education can play an instrumental role in two different ways: through *economic production* and through *social change*.

While there is a literature, albeit short, on the contribution of education on development, this does not occur for food security. In this paper I argue that especially basic education, and not training or vocational education, can improve the capacity of individuals to live a decent life and to escape from the hunger trap. The basic idea is that being educated improves rural people's capacity to diversify assets and activities, to access information on health and sanitation, to enhance human agency in addition to increasing productivity in the agricultural sector; these are all essential elements to ensure food security in the long-run.

The theoretical study is, then, accompanied by an empirical analysis. Based on data taken by the *Demographic and Health Survey*, I construct a *cross-section* model, aiming to show the impact of education on "household food insecurity". Both variables concerning basic and higher education are included to show the best predictors. Food insecurity is, instead, measured by an aggregate indicator, chosen according to available data and theoretical foundations. The model focuses first on rural areas, usually the most disadvantaged by national educational policies, and then on total countries, in order to explain the difference between urban and rural areas, defined *urban bias*.

My aim is to prove that basic education has a good (negative) explanatory capacity of food insecurity. Moreover I seek to specify if higher education gives a statistically significant contribution or not, although probably lower than basic education variables.

As a conclusion, the policy implications of my study are the following. I argue that education is both theoretically and empirically proven to be relevant in fighting food insecurity and, therefore, governments and donors aiming to tackle these problems should focus their attention to this sector. Such a policy, indeed, should be made with a specific emphasis on rural areas and keeping in mind the multiple-advantages provided by an educated and skilled society.

Introduction

In this paper, I argue that basic education is a fundamental factor in achieving food security for rural populations in developing countries. For such a purpose, I use a methodology both theoretical and empirical. The paper is structured in the following way: in section one, I examine the characteristics and the limits of the Human Capital theory; in the second part, following the Human Development Approach proposed by Amartya Sen and other scholars, I argue that one of the most valuable ends of development for developing countries is the reduction of food insecurity; in section three, I propose a theoretical model which analyzes the instrumental role of education in promoting food security in rural areas; in part four, I construct a cross-section model to explain the quantitative contribution of education in fighting food insecurity and compare this outcome between rural and urban areas; finally, based on previous arguments and results, I draw my conclusions.

Human Capital and Productivity

Theodore W. Schultz (1961) and Gary S. Becker (1962) have been the main advocates of human capital as a determinant of economic growth. Starting from the analysis of economic growth in several countries, Schultz identified the accumulation of human capital as the main factor explaining the difference between growth and accumulation of physical capital. According to him, human capital is a capital good whose value depends on five main categories of investments in human beings: 1) health, including also nutrition, 2) migration, enhancing job opportunities, 3) onthe-job training, 4) formal education, 5) study programs for adults, such as extension services in agriculture. However, most of the empirical studies within the endogenous growth theory operationalize the concept of human capital focusing on its educational component. The same occurs within studies that address the problem of agricultural productivity in rural areas of developing countries (Jamison, Lau, and Lockheed 1982; T.P. Schultz, 2005; Koffio-Tessio et.al.2005). Jamison, Lau and Lockheed, on the basis of the results derived from 18 studies conducted in several geographical areas, examined the contribution of education to agricultural development. Taking as a proxy of agricultural development the variation of productivity in this sector, the authors concluded that completing the first four years of formal schooling result in a 7.4% increase of agricultural productivity (Jamison, Lau, and Lockheed 1982, 54). Most of the critics of this approach remain in the same line of thought (Phillips 1987), proposing merely different ways to measure agricultural productivity or a wider idea of efficiency.

Heterodox Critics to Human Capital and Economic Resources

The implicit assumption behind the human capital theory is that the achievement of economic resources (total or per capita), or economic development in a dynamic version, is the final goal and that education is an input that, together with physical (and social) capital, contributes to the increase of these resources. Heterodox critics, founded on principles wider than strictly economic ones, challenge this theoretical construction.

According to the Human Development Approach (HDA), proposed by Amartya Sen, Martha Nussbaum, and Paul Patrick Streeten, **economic resources** are important only if people are finally able to convert them into something valuable by itself. "People value commodities...not in their own right but for their characteristics and for the needs they meet" (Streeten 2003, 76). These authors criticize the vision of development for being purely economic, readdress it as a process of enlarging people's choice to live a life they value (UNDP 1990, 10), through an increase of valuable human freedoms (Sen 2003). In this

context, income and other economic resources are an "intermediate goal" (Sen 2003, 3) and important instruments to promote development, but they are neither necessary nor sufficient to enlarge people's freedoms. Therefore, new ends of development should be identified: among others, the supporters of the HDA focus on having a long and healthy life, being adequately nourished, and being educated.

The second type of criticism, strictly connected to the first, concerns the value attributed to education within the human capital framework. Based on Sen's work (1997, 1959), I argue that education has a double role for development. First, a "direct" (or intrinsic) one because being educated allows people to have directly a better quality of life by enjoying, for instance, cultural events. Second, an "indirect" (or instrumental) one realized through "economic production", and through "social change" (Sen 1997, 1960). This definition outlines the limits of the human capital theory, which just looks at one of a broader range of "life- skills" provided by education (Hoffmann et al. 2004).

Albeit different, human capital and life-skills are mutually dependent. The three human capital categories suggested by Lanzi: *basic skills* (reading, writing), *professional competencies* (applied knowledge, technical skills), and *complex functionalities* (problem solving ability, selflearning skills) affect human freedoms, and *vice versa* (Lanzi 2004, 5-6). For instance, professional competencies increase human capital determining, ceteris paribus, higher productivity and income, but it has also a capacity to enlarge human freedom because obtaining a better job can raise the level of personal satisfaction, which determines a better quality of life.

Education and Food Insecurity

Following the previous critics, I start with the assumption that it is not economic growth the final goal of development, but there are other valuable ends, among which I study **food security**. The reason for this choice is that especially in developing countries, where a large part of the population faces constant deprivations, as Sen claims, income is not a good indicator of the quality of life; the consistent elements of life include "being adequately nourished" (Sen 2003, 5). That is, food security analyzed at household level, which reflects the "sustainable access to safe food of sufficient quality and quantity...to ensure adequate intake and healthy life for all members of the family" (UNICEF 1998, 23-25). Analogous to the argument that Sen (1998, 2-5) uses to promote the value of longevity, I consider the value of freedom from starvation and hunger as a desire widely shared among people for its intrinsic value and for its capacity to promote other freedoms. Indeed, not being well-nourished affects the capacity of people to work, to participate in community life, to be respected, to concentrate in school, thus this problem should be urgently addressed. Furthermore, 70% of world poor live in rural areas (World Bank 2003); therefore I propose a theoretical model which stresses the instrumental role played by basic and higher education in tackling food insecurity among rural people.

Here, using different kinds of literature as a reference, I identify the multiple mechanisms through which an educated person is more likely to be food secure. First, the impact of education can occur through *social change*.

As Mukudi (2003) claims, education has a key role in accessing public *information*,especially concerning health, nutrition, and hygiene. Acquiring knowledge about how to avoid and face illnesses is essential since people with diseases require more calories to be food secure. Furthermore, people need to have, where possible, a proper and diversified diet in order to build a stronger immune system and avoid morbidity and mortality. Finally, even following right hygienic practices is essential to prevent diseases like diarrhoea. Mass Media such as radios are widely spread in African countries, even among poor people living

in rural areas; therefore only people with a minimum level of education can properly capture and elaborate that information[19]. Even more relevant is the role of basic education, i.e. literacy, in acquiring this type of information from written messages. This argument, indeed, should be extended in an inter-temporal dimension: "parental education…has been found to invariably influence nutritional outcomes of the children. Children of less educated parents and those of parents with no educational exposure consistently score poorly on nutritional status indices" (Mukudi 2003, 246). Moreover, there is a gender aspect that does matter for ensuring long-term food security. In fact, the specific impact of women's education is higher: girls who attend school and obtain at least the basic skills can even teach right health and hygienic practices to their children once they become mothers. This means that female education should be at the centre of the analysis because it has an additional direct effect on nutritional status. Schnell-Anzola, Rowe and LeVine (2005) take as a reference an empirical research carried out by Glewwe in Morocco, which showed that maternal "education improves child health primarily by increasing health knowledge" (Glewwe 1997, 151) and that it does not depend prevalently on the subjects studied in class, but on the very general abilities to read, write, reflect, and process information.

Education, then, is fundamental to promote *agency*, which expresses the capacity of rural poor to escape from poverty and hunger with their own power. Who is educated is more likely to find a job, but has also, *ceteris paribus*, a capacity to use more rationally the resources he or she owns. Educated and informed people have more probability to select valuable objectives in life, such as having stable access to food for their household. Even in this argument, there is a gender factor. Mothers showed to assign a higher value to the well-being of their children, allocating more resources to health, and nutrition (Sen 1999, 195-196). Quoting still Sen (1999, 197), "female literacy…is found to have an unambiguous and statistically significant reducing impact on underfive mortality, even after controlling for male literacy." Therefore, a more active role of women in family is likely to lead to lower mortality rates, which, in developing countries, are mostly due to malnutrition.

A third "social" benefit of education for food security and well-being in general, is enhanced through an improvement of *social relations*. In African rural regions, for instance, the role that community actions can play is impressive. Some authors defined "social capital" (Woolcock and Narayan 2000) the social networks in which a person is included, arguing that the larger these nets the larger the possibility to find assistance in emergency situations. To make an example, man communities organize common meals, systems for a common access to credit, labour division, and public participation to ceremony expenditures. This way the risk, even to become food insecure, is alleviated, making individuals less vulnerable. The next question is: how does education affect social relations? Lanzi (2004, 13) speaks about the "positional" value of education, with reference to the ability to relate well to others and to cooperate (OECD 2003) achieved through education, even here conceived in its more general form rather than the specific topics studied in school.

Finally, education provides a *psychological* contribution to food security, making people more ambitious and self-confident. Being educated is considered a relevant weapon against feelings like shame and lack of hope, whose overcoming is indispensable to promote food security through the other mechanisms mentioned above.

The second channel through which education influences food security is "economic production". In rural areas, this is typically achieved through the increase of agricultural productivity and efficiency in that sector. However, another economic contribution of

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[19] See, for instance, Schnell-Anzola, Rowe and LeVine (2005, 20-21) drawing this conclusion from an empirical study made by D. Thomas in 1999.

education to food security was neglected: the income obtained by crops different from the main one and nonfarm activities. Rural non-farm activities were not taken into adequate consideration; instead, they can be a fundamental direct source of food or income, and, even more, a resource for the long-run. In fact, the diversification of income generating activities is essential to reduce vulnerability and recover more rapidly from emergencies like natural disasters. The various contributions of education to food security can be viewed in the diagram (appendix 1), which is a slightly modified version of the UNICEF model of the causes of malnutrition (1998, 24), and of its revision made by Mukudi (2003, 247).

A Quantitative Assessment

The objective of this quantitative analysis is to acquire evidence of the contribution given by education for rural people to food security. Based on data collected through the *Measure Demographic and Health Surveys* Program[20], first I examine the correlation between education (basic, advanced and higher) and food insecurity, and then I apply a cross-section model on aggregated survey data for the rural areas of 48 developing countries[21]. Education is expressed by school attendance rates while household food insecurity by an indicator composed of three dimensions with the same weight: one component expressing the "adequate survival status" (Wiesmann 2002), which is measured by mortality rates among rural children; a second component that reflects the idea of both "adequate nutritional status" and "food adequacy", through a measure of nutritional status of rural children; a third component that concerns "female malnutrition", expressed by the percentage of rural women whose body mass index is less than an internationally fixed threshold. This type of indicator is defined as an "outcome" indicator (Maxwell and Frankenberger 1992, 96) and well reflects the idea of food insecurity expressed in the previous section. In fact, "being adequately nourished" cannot depend only on food owned and money to buy that food because peoples' capacity to convert these commodities into effective access to adequate food varies according to age, gender, and metabolism (Sen 2003, 7). Instead, an indicator based on nutritional and survival data incorporates such diversity, since the individual outcome responds to personal characteristics.

As a first step, I carried out the correlation analysis. In the two tables below, I report the outcome of Pearson's and Spearman's correlation coefficients, divided according to the type of educational variable included: attendance rate for group of students of different ages, or maximum level of education attended.

Tab. 1 Pearson's and Spearman's correlation coefficients *school attendance-HFI1*

Coefficient	rurattendance610	rurattendance1115	rurattendance1620	rurattendance2124
Pearson	-0.7705	-0.6443	-0.4574	-0.1820[***]
Spearman	-0.7883	-0.6430	-0.4537	-0.2359[***]

Tab. 2 Pearson's and Spearman's correlation coefficients *educational level-HFI1*

Coefficient	rurnoedu	rurminsecondary	rurhigher
Pearson	0.7178	-0.5587	-0.5478
Spearman	0.7131	-0.7158	-0.7101

[20] The main source is the ORC Macro: data available online at the website
http://www.measuredhs.com/aboutdhs/
[21] One observation for each country, referred to the period 1995-2004. To see the list of variables included in the analysis, see Appendix 2.

*** Not significant at 10% significance level

Both the tables show a very high linear correlation between food insecurity and "basic education", so as measured by *rurattendance* and the inverse of *rurnoedu*. This correlation decreases for "advanced education" (*rurattendance1115* and *rurminsecondary*) and, finally, is lower or even statistically not significant for "higher education". Such a statement is coherent with the idea that food security is a *basic* element of life for rural people of developing countries, which, therefore, is explained better by the access to *basic* education. The result does not change much if I examine the Spearman's rho: the only exceptions are *rurminsecondary* and *rurhigher* whose coefficient is larger than Pearson's rho (tab. 2). This means that these two variables are well correlated to *rurHFI1*, but such a relation cannot be properly explained by a line.

The following step is the construction of the econometric model specific for rural areas. The aim is to assess the quantitative impact of education on food insecurity, controlling for other, non economic, variables which reflect important aspects like access to drinkable water, hygiene, and access to information. Variables related to income, expenditure and ownership of assets are not included due to the lack of data. I proceed running an initial model encompassing all the variables, then, through the step-wise option of Stata Software, I obtain the final model with only significant variables. Here below I report the results of the model.

Model 1: Determinants of food insecurity in rural areas

Dependent variable: rurHFI1	Coefficient	Standard Error
constant	19.82032	5.307448
rurfertility	0.6297012	0.1989238
rurattendance610	-0.1933505	0.0399088
rurnofacility	0.1177583	0.0273826
R-squared	0.777	

The first issue to address concerns its statistical validity. This model has all the main statistical properties and even the value of R Squared (0.777) is high in absolute terms. Moreover, I can reasonably sustain that the eventual addition of one or two variables linked to economic conditions of the households would make it close to the unit. Finally, I argue that these economic variables would not take large information now captured by education, leading to a general acceptance of the outcome of this analysis.

Then, I explore the theoretical implications of this model. The best predictors of household food insecurity in rural areas the following:

1. *Fertility*, which gives a very high positive contribution to the level of food insecurity. This is normal because the more children are in a family, the more problems occur in accessing food for all (See Sen 1999, 198-199; Nussbaum 2003, 335; Streeten 1997, 17-20)

2. *School attendance* of children between the age of 6 and 10, which is the second best predictor.

3. *Lack of Access to toilet facility*, as a proxy of hygienic conditions, which gives still a satisfactory contribution to food insecurity.

Given the objective of this analysis, I focus on educational variables. The results are coherent with the theoretical framework and with the correlation analysis: the educational level which affects the most food security is a basic one. This variable has a very high statistical significance (p-value = 0.000), while all the other variables related to education were excluded by the software. Concluding from this model, I argue that basic education has a good explanatory capacity of the phenomenon food insecurity and, more precisely, that an investment aiming at increasing children's school attendance rate by 100% can reduce food insecurity by approximately 19%.

Finally, I aim to compare the model applied to rural data with another applied to urban ones. Since both the deprivations: lack of education and food insecurity are much more dominant in rural areas, I examine if there are relevant differences in the factors affecting urban household food insecurity. Therefore, I first run both the models, and then I calculate the Chow test to check if there is a structural change between the two areas. The value of the Chow Test is the following: **Chow Test = 3.826**, which marks a structural change at both significance levels: 0.05 and 0.1. Second, after introducing a dummy variable: *gurban*, which takes value 0 for rural areas and value 1 for urban areas, I run the total model. Here below I report the results.

Model 2: Determinants of food insecurity: a rural-urban comparison

Dependent variable: pooledHFI1	Coefficient	Standard Error
constant	19.82032	5.061994
gurban	-2.446154	7.848573[***]
pooledfertility	0.6297013	0.189724
durbfertility	0.1055643	0.289663[***]
poolednofacility	0.1177583	0.026116
durbnofacility	0.1704578	0.060800
pooledattendance610	-0.1933505	0.038063
durbpooledattendance610	0.0244451	0.065811[***]
R-squared	0.7798	

[***] Not significant at 10% significance level

The structural change depends on the diverse impact of *poolednofacility* in the two areas: the impact is much larger in urban areas as testified by the "variable" *durbnofacility* that is the only variable showing a geographical difference which is statistically significant. For the other two independent variables, a difference exists but it is not statistically significant. As a conclusion of this analysis, I argue that the impact of basic education on food insecurity is approximately the same in urban and rural regions, while the general weight of the other explanatory variables varies. Furthermore, the R-Squared for the urban model is lower (0.70 versus 0.77), which is likely to outline a larger relevance of economic factors in these areas.

Conclusions

As a conclusion, I argue that education is both theoretically and empirically proven to be relevant in fighting food insecurity and promoting development. It was demonstrated that an increase of children's school attendance rate by 100% can reduce food insecurity by approximately 19%. Therefore, Governments and donors aiming to tackle these problems should focus their attention (and investments) on this sector.

The new perspective, here adopted, is that the contribution of an educated society goes beyond the economic growth of a country, and does affect positively the life of people, especially that of the least advantaged. Both the approaches stress the importance of investments in education, but, in my view, the Human Development Approach gives an additional justification for investing in basic education. Finally, although the comparative analysis does not emphasize regional differences, such a policy should be adopted with a specific emphasis on rural areas because of the dramatic incidence of illiteracy, food insecurity, and mortality in these places.

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APPENDIX 1

Diagram: linkages Education – Food Security – Nutrition
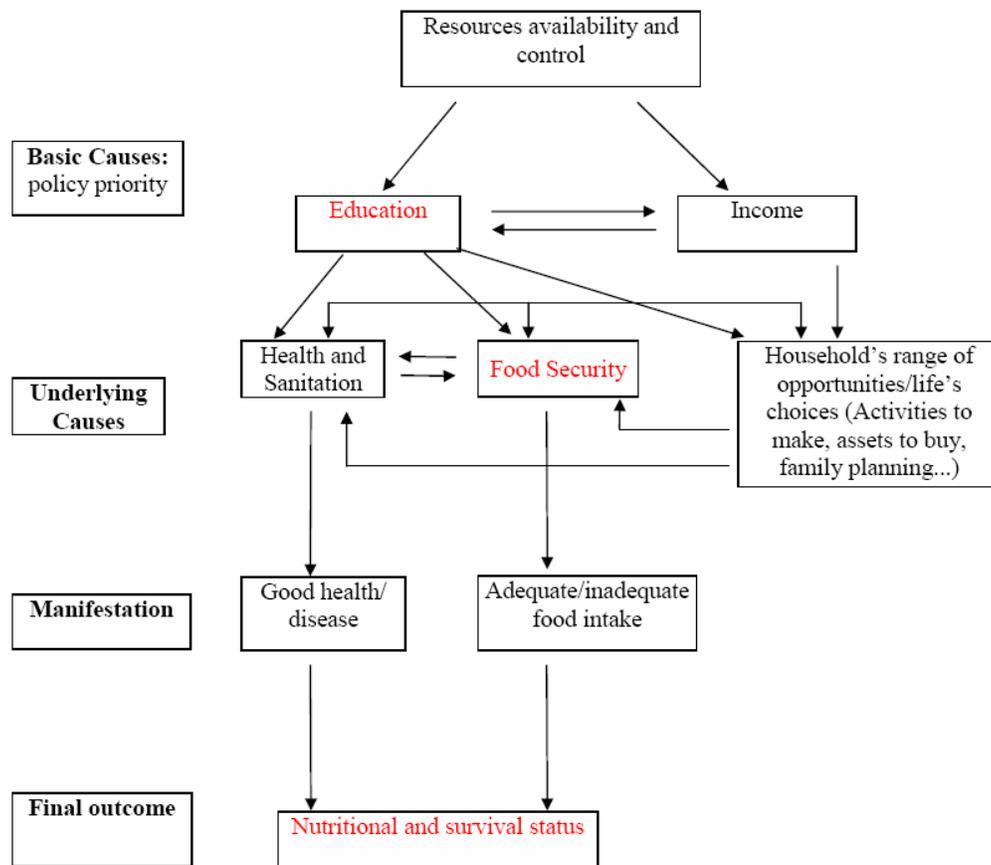
APPENDIX 2

Variables and indicators

The variables originally considered are several: below I report the list only of those concerning rural areas and divide them according to the macro-distinction between educational, household food security, and other data.

Rural Education:

1) Rural school attendance

rurattendance610	rural children 6-10 attendance rate (%)
rurattendance1115	rural children 11-15 attendance rate (%)
rurattendance1620	rural children 16-20 attendance rate (%)
rurattendance2124	rural children 21-24 attendance rate (%)

2) Educational level of rural population

rurnoedu	% of rural people with no education attended
rurminsecondary	% of rural people with either secondary or higher educational level attended
rurhigher	% of rural people with higher education attended

The variables included in these two groups are used as proxies of the following phenomena:

1) **Basic Education**: expressed by 6-10 and 6-15 school attendance and by the percentage of rural people who attended primary education or with no education (lack of basic education in the last case).

2) **Advanced Education**: 11-15 school attendance and the percentage of students with at least secondary education attended.

3) **Higher Education**: 16-20 and 21-24 school attendance and the percentage of students who have attended higher education.

Rural Household Food Security:

rurinfantmortality	rural infant mortality rate (%)
rurund5mortality	rural under-5 mortality rate (%)
rursevstg	rural severe stunting rate % (-3sd)
rurmodstg	rural moderate stunting rate % (-2sd)
rursevwstg	rural severe wasting rate % (-3sd)
rurmodwstg	rural moderate wasting rate % (-2sd)

rursevundwght	rural severe underweight rate % (-3sd)
rurmodundwght	rural moderate underweight rate % (-2sd)
rurlowbmi	percentage of rural women whose BMI is lower than 18.5 cm

The final indicator of rural household food insecurity (rurHFI1) is expressed by the following equation:

rurHFI1 = 1/3* [[[2/3]* rurmodstg + 1/3* rursevstg] + [[2/3]* rurmodwstg + 1/3* rursevwstg]

+ [[2/3]* rurmodundwght + 1/3* rursevundwght]] + [1/3]* rurlowbmi + 1/3* [[1/2]*

rurund5mortality + [1/2]* rurinfantmortality]

<u>Other Variables:</u>

rurradio	% of rural people with access to radio
rurfertility	rural fertility rate (%)
rurwater	% of rural people with access to drinkable water
rurhealth	% of rural people with diarrhoea disease
rurnofacility	% of rural people without toilet facility

Convergence of Human Development Levels

Fuat Erdal
Adnan Menderes University

Emre Can
Izmir University of Economics

Gaye Kocabaş
Izmir University of Economics

Reducing regional disparities can be seen as one of the main conditions of sustainable development. The neoclassical convergence hypothesis states that regional or inter-country differences would be reduced by development. Almost all studies test the convergence hypothesis by using per capita income levels and find mixed results. However, convergence of development levels and living standards is more important for the sustainability of economic growth.

This study aims to re-test the convergence hypothesis by employing two more indicators of development by the UNDP, namely health index and education index, in addition to per capita income levels. By using the beta convergence test, which controls if there is a tendency for per capital income to equalize across economies, convergence of development levels is tested among a panel of 177 countries.

The empirical evidences from the cross-sectional analyses suggest the existence of a significant converging trend among the countries with respect to education levels and per capita income levels.

Introduction

Convergence hypothesis states that regional or inter-country differences in terms of per capita income levels will be reduced by time, as less developed regions grow faster while developed ones slow down. As stated in Barro and Sala-i Martin (1992, 1995) and Mankiw et al (1992) and many others, several economic forces including diminishing returns to capital, spatial capital mobility, spatial labour mobility and diffusion of innovations and technologies across regions and countries give rise to convergence.

It is true that economic growth, by increasing a nation's total wealth, also enhances its potential for reducing poverty and solving other social problems. But history offers several examples where economic growth was not followed by similar progress in human development. Instead growth was achieved at the cost of greater inequity, higher unemployment, weakened democracy, loss of cultural identity or overconsumption of resources needed by future generation (Soubbotina and Sheram, 2000). UNDP's Human Development Report (1996) states that "human development is the end, economic growth a means" (UNDP, 1996).

In order to see whether development levels besides income per capita levels converge over time, this study aims to re-test the convergence hypothesis by employing two more indicators of development by the UNDP, namely health index and education index, in addition to per capita income levels. By using the beta convergence test, which controls if there is a tendency for per capital income to equalize across economies, convergence of development levels is tested among a panel of 177 countries.

In the remaining of the paper, firstly convergence hypothesis will be summarised and some recent empirical results will be given. After the data and methodology are explained, convergence hypothesis will be tested by β-convergence tests. The paper will be finalised by discussion of the findings.

Convergence Hypothesis

Convergence hypothesis is tested in various ways. Two techniques are commonly used in cross-sectional and panel data analyses :

σ-convergence explores if the dispersion of per capita income levels tend to decrease over time. σ-convergence can easily be observed by plotting the standard deviation of per capita income against time. **Coefficient of variation** can also be used to test σ-convergence (Kenworthy, 1999).

On the other hand, **β-convergence** refers to an inverse relation between the relative growth rate of income and its initial level, hence poorer countries grow faster than rich ones. The regression coefficient, β, of the initial income measures the speed of convergence. There are two types of β-convergence: With *absolute* or *unconditional convergence*, countries are converging to a common steady state. With *conditional convergence*, each country or region is converging towards its own respective steady state. In order to test the hypothesis, the following regression is estimated:[1]

$$\Delta y_{i,t,t+T} = \alpha + \beta \log(y_{it}) + \varepsilon_{i,t} \tag{1}$$

where $\Delta y_{i,t,t+T} = \log(y_{i,t,t+T} / y_{i,t})$ and y represents income per capita (or per worker).

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[1] It can be expressed in a non-linear form as: $(1 / T) \log(y_{i,t,t+T} / y_{i,t}) = \alpha + [(1 - e^{-\beta T}) / T] \log(y_{it}) + \varepsilon_{i,t}$

A negative and significant β implies the existence of convergence among stated regions or countries. Some other variables such as capital, labour, human capital and so on, that influence growth can also be included in conditional regressions. For that purpose, augmented neoclassical Solow type models are often used.

Convergence hypothesis is also tested by using time series techniques. Time series notions of convergence imply that per capita output disparities between converging economies follow a stationary process. Stochastic or deterministic convergence is therefore directly related to the unit root hypothesis in relative per capita output.[2]

Various empirical analyses have done for different countries. Results are, more or less, sensitive to the sample, period, estimation technique as well as control variables particularly in conditional tests of convergence. To cite some recent examples: One of the leading studies is Barro (1991). He finds that there is a convergence in income levels among 98 countries in the period 1960-1985. Mankiw et al (1992) provides support to Barro for only OECD countries but not all countries. On the other hand, Bairam and McRae (1999) analyses 101 countries over the period 1970-1990 and does not find an empirical support for convergence hypothesis. With regards to regional studies, Feunte (2002) on 17 Spanish regions, Akdede and Erdal (2004) on 7 Turkish regions and 73 cities, Gianetti (2002) on 108 EU regions, Drennan (1999) on 273 US States, Mallick & Carayannis (1994) on 32 Mexican regions and Persson (1997) on 24 Swedish regions show both sigma and beta convergence in the stated regions or cities. On the other hand, Cheshire & Magrini (2000) test conditional beta convergence on 122 European regions and find no support for convergence hypothesis.

Data, Model and Methodology

It is true that countries with similar average incomes can differ substantially when it comes to people's quaility of life, access to education and health care, avalilability of clean air and safe drinking water and so on. Although many studies indicate that average incomes converge each other by time, there is no research that investigates whether development levels converge too. Thus this study intends to test convergence hypothesis by employing education and health indexes of Human Development Index of the UNDP besides income index. Repeating the equation 1,

$$\Delta y_{i,t,t+T} = \alpha + \beta \log(y_{it}) + \varepsilon_{i,t} \tag{1}$$

where $\Delta y_{i,t,t+T} = \log (y_{i,t,t+T} / y_{i,t})$ and y now will indicate not only per capita income measured by PPP approach but also education index (measured by literacy rate) and health index (measured by average life expentancy).

All data on 177 countries are collected from various reports of UNDP.

The model 1 is estimated by the Ordinary Least Squares for three separate indexes and the aggregate HDI index.

Before estimations, it may be useful to have a look at some descriptive statistics, presented in Table 1, in order to see the differences among the countries:

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[2] Because cross-sectional and panel data are used in our analysis, details of time series tehniques will not be given here. Readers may see Estrin et al (2001), Li and Papell (1999) and many others.

Table 1: Descriptive Statistics (2003)

	HDI	EDU (Adult Literacy Rate)	LIFE	GDPPC
Mean	0.711	79.22	65.81	9566.341
Std Dev	0.189	20.62	12.27	10247.64
Max	0.963 (Norway)	100 (Georgia)	82 (Japan)	62,298 (Luxembourg)
Min	0.281 (Niger)	14.4 (Niger)	32.5 (Swaizaland)	548 (Sierra Leone)

Descriptive Statistics (2000)

	HDI	EDU (Adult Literacy Rate)	LIFE	GDPPC
Mean	0.703	78.13	65.37	1133.041
Std Dev	0.187	20.75	11.60	4842.307
Max	0.960 (Norway)	100 (Slovakia)	81 (Japan)	50,061 (Luxembourg)
Min	0.271 (Niger)	15.9 (Niger)	38.9 (Sierra Leone)	490 (Sierra Leone)

As seen from table 1, in year 2000 and 2003 Norway has the highest HDI value.Niger has the lowest HDI value in both years 2000 and 2003. Adult literacy rate is the highest with % 100 in Georgia in 2003 and Slovakia in 2000. Niger has the lowest adult litracy rate in 2003 and 2000, % 14.4 and 15.9, respectively.Luxembourg is the richest country with GDP per capita 62,289$ and 50,061$. Sierra Leone is the poorest country with 548$ and 490$ GDP per capita levels.

According to convergence hypothesis it is expected that the countiries with lower level of HDI will develop fater than then those with higher HDI level so in the long run countries' development levels will converge.

The data set is not sufficent for a sigma test but the standard deviations can give an idea of sigma test .

Empirical Results

Beta convergence test requires regression the growth rate of a variable on the its initial value. The model 1 is estimated by the OLS initially for the HDI index. The years 1990, 1995 and 2000 are taken as the initial year respectively. Due to data constraint, the estimations for Health Index and Education Index are carried out for only 2000 initial year.

As can be seen from Table 2, the countries of the world gets closer in terms of Human Development Index and the speed of convergence increases as the time span expands. The speed of convergence is 0.064 between 2000 and 2003, while it rises to 14.917 between 1990 and 2003. Having a negative and significant coefficient for the education index indicates the educational differences reduce by time as people become more literate. However, the differences in health standards measured by average life expactancy do not seem to be

decreasing as a result of the test. GDP per capita disparities, expressed in terms of purchasing power parity seem to be decreasing, a result that is consistent with various studies in the literature.

Table 2: Estimation Results

	Constant	β	R2	n
HDI(2000)	0.0391 (2.260)	-0.064** (-2.750)	0.064	113
HDI(1995)	10.148 (5.067)	-8.486** (-2.980)	0.058	145
HDI(1990)	16.645 (5.976)	-14.917** (-3.716)	0.093	136
EDU	14.641 (4.486)	-14.854** (-3.556)	0.068	173
LIFE	-4.049 (-1.229)	6.577 (1.399)	0.011	173
GDPPC	5.128 (4.321)	-3.643* (-2.063)	0.024	173

Concluding Remarks

The notion of human development incorporates all aspects of individuals well-being, from their education and health status to economic and political freedom. The classical convergence tests by average incomes indicate only one part of the whole picture. The study attempts to shed light on some other aspects of human development. The empirical analyses indicate thae human development levels among the countries of the world converge over time. The speed of convergence gets higher as the time span gets longer. Educational differences decreases as more people get literate. There is no sign of convergence in terms of health standards, measured by life expectency. Income per capita differences also reduce over time. More analyses are necessary to measure the club convergence (within the continent, within the country groups etc). More indicators of development could be tried to measure convergence or divergence in order to cover many other aspects of human development.

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Growth and Development

The Hotelling's Rule Revisited in a Dynamic General Equilibrium Model

Beatriz Gaitan S.
University of Hamburg,

Richard S.J. Tol
University of Hamburg,

I. Hakan Yetkiner
Izmir University of Economics

The validity of the Hotelling's rule, the fundamental theorem of nonrenewable resource economics, is limited by its partial equilibrium nature. One symptom of this limitation may be the disagreement between the empirical evidence, showing stable or declining resource prices, and the rule, predicting exponentially increasing prices. In this paper, we study the optimal depletion of a nonrenewable resource in a dynamic general equilibrium framework. We show that, in the long run, the price of a nonrenewable (i) is constant when the nonrenewable is essential in production, and (ii) increases only if the rate of return of capital is larger than the capital depreciation rate and the non-renewable is an inessential input in production. We believe that our model offers a theoretical explanation to non-growing nonrenewable prices and hence at least partially solves the paradox between the Hotelling's rule and the empirical regularity. We also show that two factors play a crucial role in determining the long run behavior of nonrenewable prices, namely the elasticity of substitution between input factors, and the long run behavior of the real interest rate. Another major achievement of this study is the full analytical solution of the model under a Cobb-Douglas technology.

Introduction

In his seminal article, Hotelling (1931) showed that the price for a nonrenewable resource will rise at the real interest rate in an efficient market equilibrium,1 a result known as the 'Hotelling's rule' since then. Hotelling's rule has become the pillar of the theory of nonrenewable resource economics and has provided the fundamental insight into the long-run behavior of the price and extraction of a resource since then.2 In time, it has been documented that the Hotelling's rule is not supported by empirical evidence. In particular, almost all empirical studies have shown that nonrenewable resources have either declining or constant prices in the last 150 years (e.g., see Krautkraemer, 1998). The response to this paradox has been the modification of the basic Hotelling's formulation by incorporating additional elements into the model (e.g., exploration costs, capital investment and capacity constraints, ore quality variations, output substitution, or uncertainty), although some authors tried alternative econometric techniques or data so as to generate rising resource prices.

Surprisingly, no one ever questioned a probable shortage in Hotelling's approach, namely the exogeneity of the discount rate. This paper approaches the paradox from this point of view and shows that the paradox may indeed be fictitious in the sense that the true Hotelling's rule may not suggest an ever-increasing nonrenewable resource price, at least not in all instances. Recall that Hotelling's rule takes the interest rate as given if the resource sector is considered in isolation. Critical information is hence lost because the interaction between the marginal productivity of capital and the nonrenewable resource is not taken into consideration. In a general equilibrium setting, on the other hand, the level of extraction has a determining role on the marginal productivity of capital and hence on the real rate of interest, where the latter influences the resource price and the level of extraction. Hence, in general equilibrium, the resource price and real interest rate are determined simultaneously, in sharp contrast with the partial equilibrium approach. Let us illustrate this endogenous determination of factor prices in case both inputs are essential.3 The marginal productivity of capital decreases if the percentage change in resource extraction is dominated by the decline in percentage change in capital. It follows that the rental rate of capital decreases. Consequently, the rate of increase in the price of the nonrenewable declines because, according to the Hotelling's rule, the rate of increase of the resource price cannot deviate from the real interest rate. Therefore, the endogenous interaction between factor prices and factor quantities may define a different time pattern for resource price than what partial equilibrium Hotelling's rule suggests. We believe that this critical endogenous interaction is missing in the 'partial equilibrium' version of the Hotelling's rule. Hence, a contradiction may arise between empirics and theory. The paradox vanishes if a "complete" solution, in the sense of an integrated nonrenewable resource sector and a good sector, is studied.

The Hotelling's rule was incorporated into (neoclassical) growth theory a long time ago, especially in the issue of sustainability. Several papers written in the 1970s hinted at the two means of achieving sustainability when an economy is dependent on nonrenewable resource: substitution for a reproducible factor and technological change (see Dasgupta and Heal (1974) and Stiglitz (1974a)). Surprisingly enough, these studies ignored a distinguishing feature of growth models with nonrenewable resources that we believe prevented them to expose the true general equilibrium version of the Hotelling's rule. A peculiar characteristic of growth models with nonrenewables that have zero marginal cost of extraction is that the resource price and rental rate of capital ratio only depends on the ratio of capital and resource extraction. Further, the resource price path can be determined independently from the rest of the model (i.e., consumption, capital, and resource extraction). If the rental rate of capital and the interest rate used to discount profits in the extraction sector are assumed identical, it leads to a differential equation in terms of capital-resource extraction ratio that does not have any counter-force on the accumulation of this ratio. The end result turns out to be a distortion of

the solutions of rental rate of capital and resource price. A good illustration is the basic Solow (1956) model. If depreciation is removed from the fundamental equation of growth, capital and hence output would grow to infinite levels. Dasgupta and Heal (1974) and Stiglitz (1974a) neglected this aspect.4 However, Hotelling's rule (that prices must grow to infinity) is not in general reproduced if capital depreciates and our paper shows exactly this.

A summary of our model is as follows. There are two factors of production, namely a reproducible capital and a nonrenewable resource, and one final output, which can be consumed or invested. The two factors may be complements or substitutes in the production of the final good. Profit-maximizing firms operating in the good market imply a unique resource price/rental ratio and a corresponding optimal capital/resource ratio. A nonrenewable resource-extracting sector solves the dynamic problem of maximizing discounted profits over an infinite horizon, constrained by the initial stock of the nonrenewable. An exogenous savings rate assumption in the Solovian (Solow (1956)) sense on the allocation of factor income and market clearing conditions for capital and the nonrenewable complete the model.

The organization of the paper is as follows. The second section presents the model under the Cobb-Douglas technology assumption. We show that the paradox between the Hotelling's rule and the empirical evidence may indeed be fictitious and that the true Hotelling's rule may suggest a constant nonrenewable resource price. The third section discusses the CES version of the model and presents numerical simulation results. The last section presents concluding remarks.

The Model

We assume that physical capital K and a nonrenewable resource R are used to produce a final good Y. The final good production technology is represented by F (K, R). It is supposed that F (•) is increasing, strictly concave, twice differentiable, homogenous of degree one, and shows a constant elasticity of substitution (CES) between K and R. The nonrenewable resource sector production technology is based on extraction. For matter of simplicity, we assume that the intertemporal consumption-investment trade-off is given to the model, as in Solow (1956). Our motivation behind this assumption is that it allows us to solve the model analytically, which then, enables us to provide extremely valuable additional insights about the transitional behavior of all the variables in the model. We are aware of the fact that we miss some information by ignoring intertemporal household allocation decisions between consumption and savings. Nevertheless, we believe that the gain we make by this simplification is larger than the loss. Furthermore, we will show below that the constant savings rate assumption does not play any role in the long run behavior of the nonrenewable resource price (and other variables).

Production Sector

Let us take the final good's price to be numeraire as traditionally done. The representative firm producing output Y solves the problem:

$$\max_{Y \geq 0} \{Y - C(r, q, Y)\} \tag{1}$$

where r and q are the rental rate of capital and the nonrenewable resource price and C (r, q, Y) is the optimized value (or cost function) of the cost minimization problem:

$$C \equiv \min_{K, R \geq 0} \{rK + qR \mid Y \leq F(K, R)\} \tag{2}$$

For analytical tractability we will exploit the Cobb-Douglas technology in the production of utput Y. In Section 3 we will generalize the model by using a CES technology.

It is easy to how that if the technology is of the Cobb-Douglas type, say, $Y = K^\alpha R^{1-\alpha}$, then the cost function associated with problem (2) equals

$$\mathbf{C}(r, q, Y) = \mathbf{MC}(r, q)Y = \left(\frac{r}{\alpha}\right)^\alpha \left(\frac{q}{1-\alpha}\right)^{1-\alpha} Y \tag{3}$$

where MC (r, q) is the marginal cost of producing a unit of output Y. The conditional factor demands for K and R can be found by applying Shephard's Lemma to the cost function:

$$K = \mathbf{C}_r(r, q, Y) = \mathbf{MC}_r(r, q)Y \tag{4}$$

and

$$R = \mathbf{C}_q(r, q, Y) = \mathbf{MC}_q(r, q)Y \tag{5}$$

The constant returns to scale property of the technology implies that C (r, q, Y) is linear in Y and thus the profit maximization problem (1) can be rewritten as

$$\max_{Y \geq 0} \{Y - \mathbf{MC}(r, q)Y\} \tag{6}$$

Note that profit maximization implies

$$\mathbf{MC}(r, q) = 1 \tag{7}$$

or the well known zero profit condition of perfect competition, where marginal cost equals output price. In this economy, we assume that a fraction s of total output Y is used to accumulate the capital stock of the economy in the form of investment

$$\dot{K} = sY - \delta K \tag{8}$$

where s is the exogenous saving rate, δ is the depreciation rate, and a dot over a variable denotes its time derivative. We assume that the economy begins with an amount of physical capital K0. Using (3) and (4) the demand for capital, given output level Y , is found to be

$$K = \frac{\alpha \mathbf{MC}(r, q)}{r} Y = \frac{\alpha}{r} Y. \tag{9}$$

Using (3) and (7) we can solve for r as follows

$$r = \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}}\right)^{\frac{1}{\alpha}} \tag{10}$$

Solving for Y from (9) , and substituting for Y and r in equation (8) we obtain

$$\dot{K} = \frac{s}{\alpha} rK - \delta K = \frac{s}{\alpha} \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}}\right)^{\frac{1}{\alpha}} K - \delta K \tag{11}$$

This is nothing but a first order differential equation with a variable coefficient and its solution is

$$K(t) = K_0 e^{\int_0^t \left(\frac{s}{\alpha} r(\tau) - \delta\right) d\tau} = K_0 e^{\int_0^t \left(\frac{s}{\alpha} (\alpha^\alpha (1-\alpha)^{1-\alpha})^{\frac{1}{\alpha}} q(\tau)^{-\frac{1-\alpha}{\alpha}} - \delta\right) d\tau} \tag{12}$$

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If we knew the path of q (t) then from (12) the path of K (t) would also be known. To solve for the path of q (t) we now look at the nonrenewable extracting sector's problem.

Extraction Sector

Hotelling (1931) determined the optimal extraction of nonrenewable resources in a perfectly competitive market economy in a partial equilibrium setup. We exploit his setup in order to determine the dynamics defined by the resource sector. Suppose that extraction is costless. The representative firm taking q as given solves the following maximization problem:

$$\max_{R \geqq 0} \left\{ \int_0^\infty q(t) R(t) e^{-\int_0^t (r(\tau)-\delta)d\tau} \, \bigg| \, \int_0^\infty R(t) \leqq S_0 \right\} \tag{13}$$

According to equation (13), the representative firm in the resource sector maximizes discounted profits over an infinite horizon subject to the physical resource constraint that total extraction can be utmost the initial stock S0. In (13), r (t) − δ is the real interest rate. In contrast to the partial equilibrium Hotelling's approach the real interest rate is endogenously determined in our model. Equation (13) is an isoperimetric problem of calculus of variations. The Lagrangian integrand becomes

$$\mathbf{L} = q(t) R(t) e^{-\int_0^t (r(\tau)-\delta)d\tau} - \lambda R(t) \tag{14}$$

where λ is Lagrange multiplier and constant (see Chiang, 1992, p.139-143 for a proof of argument). The solution of this isoperimetric calculus of variations problem leads to the following Euler-Lagrange equation:

$$q(t) = \lambda e^{\int_0^t (r(\tau)-\delta)d\tau} \tag{15}$$

The transversality condition of this problem is given by (see Chiang, 1992, p.101-102)

$$\lim_{t \to \infty} qRe^{-\int_0^t (r(\tau)-\delta)d\tau} = 0 \tag{16}$$

Taking the log time derivative of (15) and employing Leibniz's rule we obtain the Euler condition of problem (13)

$$\frac{\dot{q}(t)}{q(t)} = r(t) - \delta \tag{17}$$

Equation (17) is a non-arbitrage condition saying that the nonrenewable is essentially an asset and therefore its (real) price must grow at the real interest rate.[5]
Substituting (10) into (17) we obtain:

$$\dot{q}(t) = q(t) \left(\left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}} \right)^{\frac{1}{\alpha}} - \delta \right) \tag{18}$$

The solution to this differential equation is given by:

$$q(t) = \left(\frac{\left(\alpha^\alpha (1-\alpha)^{1-\alpha} \right)^{\frac{1}{\alpha}}}{\delta} + \frac{1}{e^{\frac{1-\alpha}{\alpha}\delta t}} \left(q(0)^{\frac{1-\alpha}{\alpha}} - \frac{\left(\alpha^\alpha (1-\alpha)^{1-\alpha} \right)^{\frac{1}{\alpha}}}{\delta} \right) \right)^{\frac{\alpha}{1-\alpha}} \tag{19}$$

As time evolves to infinity, the nonrenewable resource price q converges to

$$q_{ss} = \lim_{t \to \infty} q(t) = \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{\delta^\alpha} \right)^{\frac{1}{1-\alpha}} \tag{20}$$

That is, q is constant in the long run.6 Note that equation (19) depends on q (0) which has to be determined from the model. To find the value of q (0) , we use the constraint

$$\int_0^\infty R(t) \leqq S_0 \tag{21}$$

First, we employ the factor-input condition obtained by using (4) and (5)

$$R = \left(\frac{1-\alpha}{\alpha} \right) \frac{r}{q} K \tag{22}$$

Next, substituting (10) and (12) into (22) we obtain

$$R(t) = \frac{(1-\alpha)\,r}{\alpha}\frac{1}{q}K_0 e^{\int_0^t \left(\frac{s}{\alpha}(\alpha^\alpha(1-\alpha)^{1-\alpha})^{\frac{1}{\alpha}} q(\tau)^{-\frac{1-\alpha}{\alpha}} - \delta \right) d\tau} \tag{23}$$

We can integrate (23) to solve for q (0) if (21) holds with equality. We claim that if an equilibrium exists then (21) must hold with equality. Note that equation (15) indicates that λ = q (0). For an equilibrium to exist it must be the case that q (0) is positive. Otherwise, sector Y would demand an infinite amount of R, which is infeasible since R is bounded by S0. Thus, the existence of equilibrium requires q (0) (= λ) to be positive and therefore the constraint (21) holds with equality. This allows us to use (21) to solve for q (0) . Substituting (23) into (21) and solving for q (0) we obtain (see Appendix B for derivations of this result)

$$q(0) = \left(\frac{1-\alpha}{\alpha - s} \right) \frac{K_0}{S_0} \tag{24}$$

We impose the condition that the share of capital is greater than the savings rate (α > s) in order to assure a positive initial resource price. Indeed, this condition is also required by the transversality condition defined by (16). To see this, first note that $q = \lambda e^{\int_0^t i(\tau)d\tau}$ from equation (15). Hence, the transversality condition, equation (16) , can be rewritten as

$$\lim_{t \to \infty} \lambda e^{\int_0^t i(\tau)d\tau} R(t) e^{-\int_0^t i(\tau)d\tau} = \lambda \lim_{t \to \infty} R(t) = 0 \tag{25}$$

Thus, for the transversality to be satisfied we must have that

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$$\lim_{t \to \infty} R(t) = 0 \tag{26}$$

which can be trivially shown under the assumption that $\alpha > s$ (cf., equation (30) below).

It should be noted that the long run value of q is only influenced by technological parameters and the depreciation rate of capital δ, though the exogenous savings rate s has some effect on its value transitionally. In other words, the long run value (steady state) of q is free of the constant savings rate assumption. Substituting (20) and (24) into (19) we obtain the path of q (t) which is given by

$$q(t) = \left(q_{ss}^{\frac{1-\alpha}{\alpha}} + \left(\left(\frac{1-\alpha}{\alpha - s} \frac{K_0}{S_0} \right)^{\frac{1-\alpha}{\alpha}} - q_{ss}^{\frac{1-\alpha}{\alpha}} \right) e^{-\frac{1-\alpha}{\alpha}\delta t} \right)^{\frac{\alpha}{1-\alpha}} \tag{27}$$

Thus q (t) approaches qss from below (above) if

$$\frac{K_0}{S_0} < (>) \left(\frac{\alpha}{\delta} \right)^{\frac{\alpha}{1-\alpha}} (\alpha - s) \tag{28}$$

and converges asymptotically to a constant. This finding is important for two reasons. Firstly, we show that non-renewable price does not necessarily increase in the long-run, even in such a case that it is an essential input in production. Secondly, transitionally, the resource price may increase or decrease, depending on the relative size of the initial capital stock to resource stock. For example, if $\frac{K_0}{S_0} < \left(\frac{\alpha}{\delta} \right)^{\frac{\alpha}{1-\alpha}} (\alpha - s)$, the resource price will increase at decreasing rates and converge to its steady-state value from below. Hence, resource prices may transitionally show diverging behaviors in different economies and/or for different nonrenewable resource stocks.

We also have from (12) and (24) that[7]

$$K(t) = K_0 \left(\frac{q(t)}{q(0)} \right)^{\frac{s}{\alpha}} e^{-\left(\frac{\alpha - s}{\alpha} \right) \delta t} \tag{29}$$

$$= K_0 \left(q(t) \left(\frac{\alpha - s}{1 - \alpha} \right) \frac{S_0}{K_0} \right)^{\frac{s}{\alpha}} e^{-\left(\frac{\alpha - s}{\alpha} \right) \delta t}$$

Note that as t goes to infinity K (t) approaches zero and its long run growth rate equals $-\left(\frac{\alpha - s}{\alpha} \right) \delta$. Equation (20) and (17) imply that r does not grow in the long run and equals the depreciation rate of capital δ. Using (22) and (29) we obtain

$$R(t) = \left(\frac{1-\alpha}{\alpha} \right) \frac{r(t)}{q(t)} K_0 \left(q(t) \left(\frac{\alpha - s}{1 - \alpha} \right) \frac{S_0}{K_0} \right)^{\frac{s}{\alpha}} e^{-\left(\frac{\alpha - s}{\alpha} \right) \delta t} \tag{30}$$

Thus asymptotically R (t) shows the same properties as K. The single most important finding of the model is that the resource price q is constant in the long run. Our explanation is that resource depletion has immediate impacts on factor prices that are fed back to capital accumulation and resource extraction. In the C-D case, though capital stock starts to decline after a while, the decrease in resource extraction lowers marginal productivity of capital and hence the real interest rate. The decrease in the interest rate means a lower rate of growth in the resource price that further lowers extraction level. The "vicious" cycle generates an optimal (contraction) path for all variables. This finding is a counter-example to the partial equilibrium Hotelling's rule suggesting that resource prices are not necessarily growing. It

also contradicts with previous general equilibrium studies, e.g., Dasgupta and Heal (1974). Below, in Table I , we compare and contrast our results (GTY) with that study (D-H) for the C-D technology.

Table I Long run behavior of variables

	D-H	GTY
r	0	δ
q	∞	$\left(\frac{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}{\delta^{\alpha}}\right)^{\frac{1}{1-\alpha}}$
K	0	0
R	0	0

The basic difference between our model and Dasgupta and Heal's model can be observed from Table I. Firstly, recall that q and r in a growth model with a nonrenewable are solely function of K/R and that they are independent from the rest of the model. In Dasgupta and Heal, the ratio K/R approaches infinity. In our model, K/R approaches a constant and hence q and r also approach a constant. Note that results of D-H is obtained when $\delta = 0$ is assumed on GTY.

Monopoly

An alternative market structure assumption in the resource market is monopoly. In our model, a monopolist who owns all deposits takes into account the relationship between q and R, so that the necessary condition in (15) becomes marginal revenue equal to marginal user cost. Hence, marginal revenue (and not price) will rise at the rate of interest (in case of zero extraction costs). But this in itself does not tell us whether the resource will be extracted more or less rapidly than by competitive producers. Some, following Hotelling (1931, p.153), might assume that the rate of resource extraction is reduced because of "the general tendency for production to be retarded under monopoly". However, as Weinstein and Zeckhauser (1975), Sweeney (1977), Stiglitz (1976), and Kay and Mirrlees (1975) discussed and showed, the deviation in the extraction behavior of monopolist with respect to the perfectly competitive case depends on the price elasticity of demand. In particular, under the constant elasticity demand schedules, with zero extraction costs, monopoly prices and competitive equilibrium prices will in fact be identical, and hence the rate of utilization of the natural resource. Since our analytical model exploits a Cobb-Douglas technology, it implies a constant elasticity demand and therefore monopoly and perfectly competitive cases are identical. Unfortunately, algebra becomes unnecessarily complicated for the CES case. Therefore, we ignore these analysis in this paper.

The CES Technology

We now assume that the technology for producing output Y is given by

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$$Y = (\alpha K^\rho + (1 - \alpha) R^\rho)^{\frac{1}{\rho}} \tag{31}$$

where $\rho \epsilon (-\infty, 1]$, α is the distribution parameter, and $\sigma = \frac{1}{1-\rho}$ is the elasticity of substitution between K and R. With this technology the cost function similar to the one specified in (3) is given by

$$\mathbf{C}(r, q, Y) = \mathbf{MC}(r, q) Y = \frac{rq}{\left(\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{1-\rho}} + (1 - \alpha)^{\frac{1}{1-\rho}} r^{\frac{\rho}{1-\rho}}\right)^{\frac{1-\rho}{\rho}}} Y \tag{32}$$

Since the envelope properties of the cost function still hold we have that

$$K = \mathbf{C}_r(r, q, Y) = \frac{\alpha^{\frac{1}{1-\rho}} q^{\frac{1}{\rho-1}}}{\left(\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{\rho-1}} + (1 - \alpha)^{\frac{1}{1-\rho}} r^{\frac{\rho}{\rho-1}}\right)^{\frac{1}{\rho}}} Y \tag{33}$$

and

$$R = \mathbf{C}_q(r, q, Y) = \frac{(1 - \alpha)^{\frac{1}{1-\rho}} r^{\frac{1}{\rho-1}}}{\left(\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{\rho-1}} + (1 - \alpha)^{\frac{1}{1-\rho}} r^{\frac{\rho}{\rho-1}}\right)^{\frac{1}{\rho}}} Y \tag{34}$$

Using the zero profit condition (7) and (32) we can simplify K to get

$$K = \frac{\alpha^{\frac{1}{1-\rho}}}{r^{\frac{1}{1-\rho}}} Y \tag{35}$$

Substituting this expression into (8) we obtain

$$\dot{K} = s \frac{r^{\frac{1}{1-\rho}}}{\alpha^{\frac{1}{1-\rho}}} K - \delta K \tag{36}$$

Using (7) and (32) we can solve for r in terms of q to obtain

$$r = \left(\frac{\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{1-\rho}}}{q^{\frac{\rho}{1-\rho}} - (1 - \alpha)^{\frac{1}{1-\rho}}}\right)^{\frac{1-\rho}{\rho}} \tag{37}$$

substituting (37) into (36) we obtain

$$\dot{K} = \frac{s}{\alpha^{\frac{1}{1-\rho}}} \left(\frac{\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{1-\rho}}}{q^{\frac{\rho}{1-\rho}} - (1 - \alpha)^{\frac{1}{1-\rho}}}\right)^{\frac{1}{\rho}} K - \delta K \tag{38}$$

the solution to this first order differential equation is given by

$$K(t) = K_0 e^{\int_0^t \left(s\alpha^{\frac{-1}{1-\rho}} r(\tau)^{\frac{1}{1-\rho}} - \delta \right) d\tau} \qquad (39)$$

$$= K_0 e^{\int_0^t \left(s\alpha^{\frac{-1}{1-\rho}} \left(\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{1-\rho}} \right)^{\frac{1}{\rho}} \left(q(\tau)^{\frac{\rho}{1-\rho}} - (1-\alpha)^{\frac{1}{1-\rho}} \right)^{-\frac{1}{\rho}} - \delta \right) d\tau}$$

Analogous to the Cobb-Douglas case, if we knew how q evolves over time then the path of K would be fully determined. We now turn into the extracting sector's problem to find the path of q (t) . Substituting (37) into (17) we obtain

$$\frac{\dot{q}(t)}{q(t)} = \left(\frac{\alpha^{\frac{1}{\rho}} q}{\left(q^{\frac{\rho}{1-\rho}} - (1-\alpha)^{\frac{1}{1-\rho}} \right)^{\frac{1-\rho}{\rho}}} - \delta \right) \qquad (40)$$

This expression however does not have an analytical solution. Therefore, we solve the model numerically and find the transition paths of all the variables of the model under different elasticity assumptions. Before this let us look at the stability and long run properties of the model in the CES case.

Long Run Equilibria and Stability Properties

In this subsection, we present the long-run stability properties and long run equilibria of the CES case. Note that all the variables of the model could be found if the path of q (t) were known. Thus, it is sufficient to look at the stability properties of equation (40). To this end, we compute the derivative of (40) and examine it under each of the possible long-run behaviors of q, as indicated in Table II:

Table II Stability property cases

Case 1 $\frac{\dot{q}}{q} = 0$ in the long run	$\Longrightarrow$ q is constant in the long run
Case 2 $\frac{\dot{q}}{q} < 0$ in the long run	$\Longrightarrow \lim_{t \to \infty} q(t) = 0$
Case 3 $\frac{\dot{q}}{q} > 0$ in the long run	$\Longrightarrow \lim_{t \to \infty} q(t) = \infty$

Recall that for a system to be stable around some value q^* we should have that $\left. \frac{d\dot{q}}{dq} \right|_{q^*} < 0.$

Denote as ϵ the derivative $\frac{d\dot{q}}{dq}$ which is given by

$$\frac{d\dot{q}}{dq} = \alpha^{\frac{1}{\rho}} q \frac{\left(q^{\frac{\rho}{1-\rho}} - 2(1-\alpha)^{\frac{1}{1-\rho}}\right)}{\left(q^{\frac{\rho}{1-\rho}} - (1-\alpha)^{\frac{1}{1-\rho}}\right)^{\frac{1}{\rho}}} - \delta \tag{41}$$

Case 1 $\frac{\dot{q}}{q} = 0$

If $\frac{\dot{q}}{q} = 0$, then (17) implies that r = δ. Using (37) to solve for q and setting r = δ, we have that as t evolves to infinity q approaches its long run or steady state value q^*_{ss}

$$q^*_{ss} = \left(\frac{(1-\alpha)^{\frac{1}{1-\rho}} \delta^{\frac{\rho}{1-\rho}}}{\delta^{\frac{\rho}{1-\rho}} - \alpha^{\frac{1}{1-\rho}}}\right)^{\frac{1-\rho}{\rho}} \tag{42}$$

We now use (41) and the rule $\left.\frac{d\dot{q}}{dq}\right|_{q^*_{ss}} < 0$ to verify whether Case 1 and (42) represent a stable long run equilibrium. (41) evaluated at (42) equals

$$\epsilon_{q^*_{ss}} = \delta \left[\frac{\alpha^{\frac{1}{1-\rho}} - \delta^{\frac{\rho}{1-\rho}}}{\alpha^{\frac{1}{1-\rho}}}\right] \tag{43}$$

Note that $\epsilon_{q^*_{ss}}$ is less than zero as long as $\alpha^{\frac{1}{1-\rho}} < \delta^{\frac{\rho}{1-\rho}}$ or $\alpha < \delta^\rho$. That is, if $\alpha < \delta^\rho$ then a long run equilibrium for which $\frac{\dot{q}}{q} = 0$ represents a stable equilibrium. Note that the Cobb-Douglas case presented in the previous subsection refers to the case where ρ = 0. Since $\alpha < 1$ then Case 1 applies to the Cobb-Douglas technology.

Case 2 $\frac{\dot{q}}{q} < 0$

We can easily rule out case 2 as a long run equilibrium solution. Note that if $\frac{\dot{q}}{q} < 0$, then we must have that $\lim_{t \to \infty} q(t) = 0$; in such a case, sector Y 's problem does not have a solution and equilibrium does not exist.

Case 3 $\frac{\dot{q}}{q} > 0$

Using (37) q can be expressed in terms of r:

$$q = \left(\frac{(1-\alpha)^{\frac{1}{1-\rho}} r^{\frac{\rho}{1-\rho}}}{r^{\frac{\rho}{1-\rho}} - \alpha^{\frac{1}{1-\rho}}} \right)^{\frac{1-\rho}{\rho}} \tag{44}$$

(44) implies that for q to be infinite it must be that $r^{\frac{\rho}{1-\rho}}$ approaches $\alpha^{\frac{1}{1-\rho}}$. The other alternatives for q to approach infinity such as $r \to \infty$ or $r \to 0$ can be easily ruled out (see appendix C). Note that since r approaches $\alpha^{\frac{1}{\rho}}$ as time goes to infinite, then it is also the case that $\frac{\dot{q}}{q}$ approaches the constant $r - \delta = \alpha^{\frac{1}{\rho}} - \delta$. To study if $\frac{\dot{q}}{q} > 0$ represents a stable equilibrium we first normalize q as follows. Let

$$\tilde{q} = \frac{q}{e^{\left(\alpha^{\frac{1}{\rho}} - \delta\right)t}} \tag{45}$$

so that

$$\frac{\dot{\tilde{q}}}{\tilde{q}} = \frac{\dot{q}}{q} - \left(\alpha^{\frac{1}{\rho}} - \delta\right) \tag{46}$$

note that

$$\frac{\dot{\tilde{q}}}{\tilde{q}} = \left(\frac{\alpha^{\frac{1}{1-\rho}} q^{\frac{\rho}{1-\rho}}}{q^{\frac{\rho}{1-\rho}} - (1-\alpha)^{\frac{1}{1-\rho}}} \right)^{\frac{1-\rho}{\rho}} - \alpha^{\frac{1}{\rho}}$$

$$= \frac{\alpha^{\frac{1}{\rho}} e^{\left(\alpha^{\frac{1}{\rho}} - \delta\right)t} \tilde{q}}{\left(e^{\frac{\rho}{1-\rho}\left(\alpha^{\frac{1}{\rho}} - \delta\right)t} \tilde{q}^{\frac{\rho}{1-\rho}} - (1-\alpha)^{\frac{1}{1-\rho}} \right)^{\frac{1-\rho}{\rho}}} - \alpha^{\frac{1}{\rho}} \tag{47}$$

setting $\dot{\tilde{q}} = 0$ and simplifying we get

$$\tilde{q} = \left(\tilde{q}^{\frac{\rho}{1-\rho}} - \frac{(1-\alpha)^{\frac{1}{1-\rho}}}{e^{\frac{\rho}{1-\rho}\left(\alpha^{\frac{1}{\rho}}-\delta\right)t}} \right)^{\frac{1-\rho}{\rho}} \tag{48}$$

for this to hold we must have that both $\alpha^{\frac{1}{\rho}} - \delta > 0$ (note that for $\frac{\dot{q}}{q} > 0$ to hold it must be that $\alpha^{\frac{1}{\rho}} - \delta > 0$) and $\rho > 0$. That is, for q to represent a "stable" equilibrium when it approaches infinite it must be that $\alpha^{\frac{1}{\rho}} - \delta > 0$ and $\rho > 0$.

We now summarize. The following represent stable long run equilibria:

i) If $\alpha^{\frac{1}{\rho}} < \delta$ then,

$$\lim_{t \to \infty} \frac{\dot{q}}{q} = 0 \tag{49}$$

$$\lim_{t \to \infty} q = \left(\frac{(1-\alpha)^{\frac{1}{1-\rho}} \delta^{\frac{\rho}{1-\rho}}}{\delta^{\frac{\rho}{1-\rho}} - \alpha^{\frac{1}{1-\rho}}} \right)^{\frac{1-\rho}{\rho}} \tag{50}$$

$$\lim_{t \to \infty} r = \delta \tag{51}$$

$$\lim_{t \to \infty} K = 0 \tag{52}$$

$$\lim_{t \to \infty} R = 0 \tag{53}$$

ii) If $\alpha^{\frac{1}{\rho}} > \delta$ and $\rho > 0$ then,

$$\lim_{t \to \infty} \frac{\dot{q}}{q} = \alpha^{\frac{1}{\rho}} - \delta > 0 \tag{54}$$

$$\lim_{t \to \infty} q = \infty \tag{55}$$

$$\lim_{t \to \infty} r = \alpha^{\frac{1}{\rho}} \tag{56}$$

$$\lim_{t \to \infty} K = \infty \tag{57}$$

$$\lim_{t \to \infty} R = 0 \tag{58}$$

For an economy to afford higher values of q at the steady state (as case (ii) indicates) it must be that the marginal physical product of capital $r = \alpha^{\frac{1}{\rho}} (> \delta)$ is large enough as to compensate for the lost of capital due to depreciation. In such case capital accumulates and

the economy displays positive growth. Note that only when $\rho > 0,$ output can be positive even though R may be zero, (Y (K, 0) > 0). In other words, capital and the nonrenewable resource must be substitutes in production, if positive output has to be assured. Hence, a precondition for the prices of nonrenewables to approach infinite $(q \rightarrow \infty)$ is the ability of the economy to accumulate capital and the degree of substitution between K and R.

At this point, we would like to pinpoint another contributing aspect of our study. Contrary to what Dasgupta and Heal (1974) propose, here we find that the long run behavior of q does not only depend on whether inputs are substitutes or not in production. In addition to this, the long run behavior of q also depends on the size of the rate of depreciation and the CES share parameter α. In Dasgupta and Heal (1974), $\sigma > 1$ always leads the economy to infinitely value the nonrenewable in the long-run. We above showed that for low levels of substitution (i.e., for ρ values that approach zero from the right), the condition $\left(\alpha^{\frac{1}{\rho}} < \delta\right)$ holds and the result $\frac{\dot{q}}{q} = 0$ realizes. Figure 1 below depicts the threshold level.

Stability of q(t) for α=0.7 and δ=0.04

$$\alpha^{1/\rho}$$

$$\delta = 0.04$$

0.60

0.30

0.00

0   0.2   0.4   0.6   0.8   1

ρ
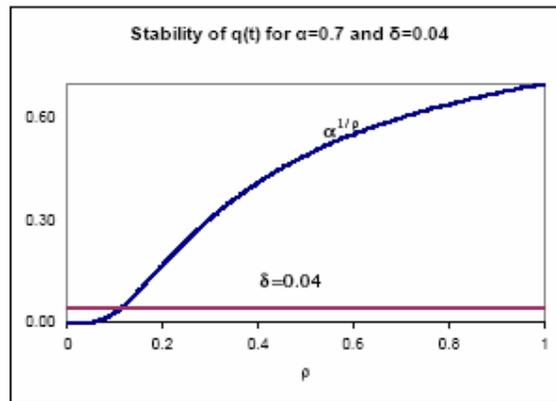
Figure 1 Stability of $q(t)$

When $\left(\alpha^{\frac{1}{\rho}} < \delta\right)$ holds, the long run marginal productivity of capital becomes insufficient to compensate for the loss in capital depreciation and hence results diverge from the "general solution," where resource price grows to infinite values. This result also shows that the rate of depreciation plays an important role in the behavior of the nonrenewable resource price.

Simulations

The simulations of the CES case reveal valuable information on the time path of the model's variables under varying elasticity of substitution assumptions. Below, we present the

time paths of the rental rate of capital r, resource price q, capital K, and extraction rate R. We assume the following parameter values:

$s = 0.2$, $\delta = 0.04$, $\alpha = 0.7$, $K_0 = 50$, $S_0 = 25$, and $\rho = \frac{1}{3}$ ($\Rightarrow \sigma = 1.5$),

or $\rho = 0$ ($\Rightarrow \sigma = 1$), or $\rho = -\frac{1}{9}$ ($\Rightarrow \sigma = .9$). Note that when $\rho = \frac{1}{3}$ ($\Rightarrow \sigma = 1.5$)

we have that the conditions of stability for Case 3 hold $(\alpha^{\frac{1}{\rho}} - \delta = 0.545 > 0$ and $\rho = \frac{1}{3} > 0)$ and therefore the price of the nonrenewable grows to infinity (see Figure 3). When $\rho = 0$ ($\Rightarrow \sigma = 1$) or $\rho = -\frac{1}{9}$ ($\Rightarrow \sigma = 0.9$) the stability condition of Case 1 holds which refers to the case where q converges to a constant.

The rental rate of capital shows a similar behavior in the three cases in the sense that it always converges to a constant (see Figure 2). Nonetheless, r converges to different levels, depending on the elasticity of substitution assumption. In particular, when $\rho = \frac{1}{3}$ ($\Rightarrow \sigma = 1.5$), r converges to $r = \alpha^{\frac{1}{\rho}}$, given that $\alpha^{\frac{1}{\rho}} - \delta > 0$ holds. When $\rho = 0$ ($\Rightarrow \sigma = 1$) or $\rho = -\frac{1}{9}$ ($\Rightarrow \sigma = .9$) we observe that r tends to δ. In the former case, the level of r is large enough to compensate for the loss of capital due to depreciation, and hence, capital accumulates and tends to infinity as Figure 4 displays. Otherwise, capital stock tends to zero level after showing some increase initially. The behavior of resource price is substantially affected by the rental rate of capital. When that rate converges to δ, the net return for capital assets become zero, and hence the price of nonrenewable converges to a constant. Otherwise, its price explodes (see Figure 3). The extraction R path of the non-renewable resource tends to zero for any elasticity of substitution assumption; nonetheless, larger levels of extraction are observed in the short run when the resource is a substitute in production. This is optimal as the economy calculates that it may initially exploit resource stocks for accelerating capital accumulation, which can be later used to substitute for the resource as it depletes (see Figure 5).
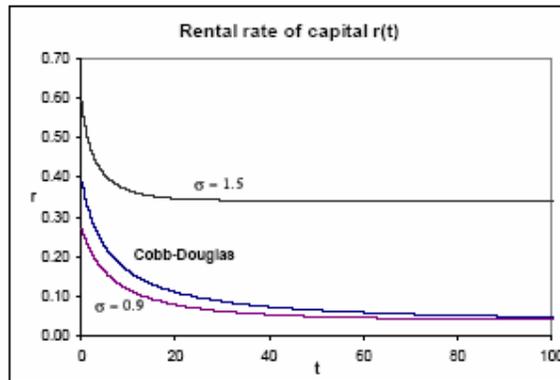
Figure 2 The time path of $r(t)$
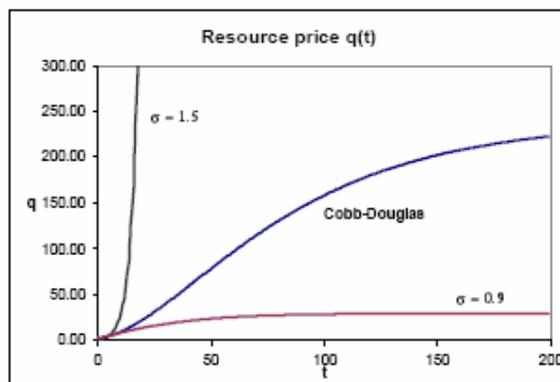
Figure 3 The time path of $q(t)$
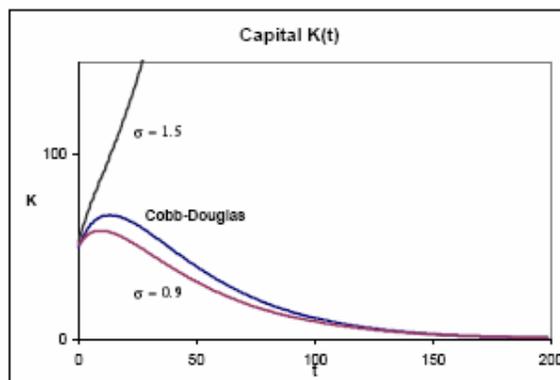
Figure 4 The time path of $K(t)$
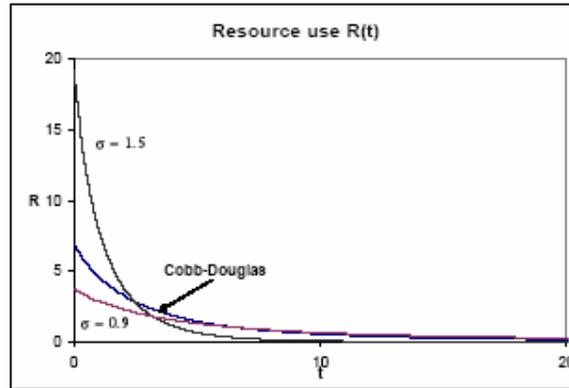
Figure 5 The time path of $R(t)$

Our numerical simulations for the case $\alpha < \delta^\rho$ with $\sigma > 1$ confirm our stability analysis, indicating that an elasticity of substitution greater than one between a nonrenewable and reproducible capital is not sufficient to generate a growing economy. Figure 6 shows the simulation of GDP for parameter values $\alpha = .7, \delta = .04, \rho = 0.047619 \ (\Rightarrow \sigma = 1.05)$. Notice that $\alpha^{\frac{1}{\rho}} - \delta < 0$ under these assumptions. Our explanation to this behavior is that net returns to capital approach zero and hence the model economy cannot sustain sufficient incentives for accumulating capital. It is also matter of interest to see from Figure 7 that the resource price converges to a constant in the long run. We conclude that the system can generate sustainable growth if both $\sigma > 1$ and $\alpha > \delta^\rho$, opposite to the argument of Dasgupta and Heal (1974) that $\sigma > 1$ is a sufficient condition.
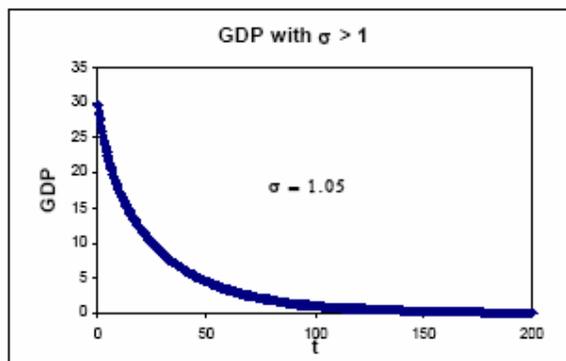
Figure 6 The time path of GDP(t) for $\alpha < \delta^\rho$ and $\sigma > 1$

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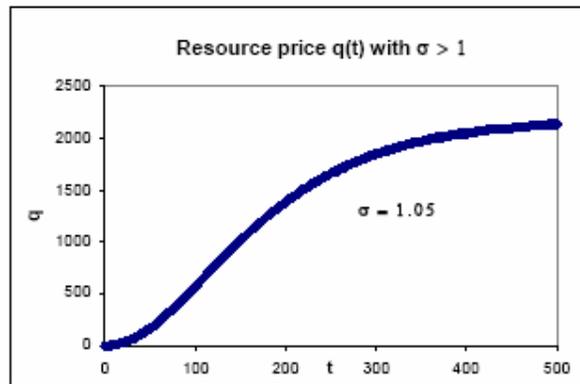
Figure 7 The time path of $q(t)$ for $\alpha < \delta^\rho$ and $\sigma > 1$

Conclusion

In this paper, inspired by Dasgupta and Heal (1974), we have studied the growth behavior of an economy in the presence of a nonrenewable resource. Like Dasgupta and Heal (1974), we integrated a nonrenewable resource sector with an output sector. In contrast to them, we focused on market solution, as it reveals clearer information on the behavior of variables and on Hotelling's rule. The basic difference between our model and Dasgupta and Heal's model, however, is that we differentiate between the rental rate of capital and interest rate, which is used to discount profits in the resource sector. This single difference substantially changes the transitional and long-run behavior of the rental rate of capital r and the non-renewable resource price q. This is because the efficiency rule for resource extraction can be expressed as a differential equation in terms of capital-resource extraction ratio, which grows infinitely if there is no countervailing factor. We first show analytically that, with a Cobb-Douglas technology, the nonrenewable resource price converges to a constant. Next, we extend our analysis to CES technology using simulations, and show that a similar behavior of resource price is observed if the nonrenewable is a complement. Our simulation analysis also reveals that the elasticity of substitution assumption heavily affects the path of depletion and capital accumulation. We show that for levels of elasticity of substitution close to one from the right the model reproduces results similar to those cases when R is an essential input in production. We conclude that the economy would shrink if elasticity of substitution is not sufficiently greater than one.

Our analysis shows that the dynamic general equilibrium version of Hotelling's rule does not necessarily imply an infinitely growing resource price. This solves, at least partially, the paradox between the Hotelling's rule and the empirical evidence that resource prices are constant in the long-run. However, our results are not complete due to at least two reasons, which brings us to suggest two research questions.

First, our analysis needs to be extended into Ramsey setup, where the saving/consumption allocation is endogenously made. We believe that the (long-run) results would not change qualitatively. Nevertheless, an endogenous saving/consumption allocation brings into stage an important additional factor in depleting-resource analysis: the consumer's patience. When it is known that a nonrenewable resource is being depleted, discounting the future plays a crucial role in consumptioninvestment decisions. In that respect, the impact of

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the consumer's patience on the optimal depletion of resources must be significant and deserves investigation.

Secondly, we ignored technological improvements in our analysis. However, technological change is the second alternative way of mitigating resource needs and may reduce the demand for nonrenewable resources. Hence, the optimal behavior of resource price may change significantly under technological change. This is the second area that we suggest for future work.

Notes

1. Hotelling (1931) assumes the real interest rate to be a constant.

2. A short review of the literature is as follows. Gray (1914) was the first who discussed the nonrenewable resource problem from the firm's viewpoint. Hotelling (1931) made the full analytical treatment. Herfindahl (1955) studied Gray's work analytically. Gordon (1967) presented a concise review of the literature and discussed a case where cumulative extraction increases costs. Smith (1968) presented a unified theory of production of natural resources. Dasgupta and Heal (1974), Solow (1974), and Stiglitz (1974a, 1974b) investigated conditions for a sustainable consumption in one-sector growth models constrained by nonrenewable resources. These papers show that technological change and a high degree of substitutability between nonrenewables and reproducible capital are necessary conditions for achieving a non-decreasing consumption. See surveys of Peterson and Fisher (1977) and Krautkraemer (1988) for a good exposure to the rest of the literature.

3. We call a factor input essential if a positive amount of such input is necessary to produce a positive level of output.

4. Stiglitz (1974a, p.124) states that "As usual, we either can think of Q as net output, or we can explicitly assume that there is no depreciation. The necessary modifications for exponential depreciation are straightforward". This paper shows that excluding depreciation matters a lot.

5. In appendix A we show that not nominal but real prices matter. We also show that capital price appreciation is irrelevant in the real interest rate determination, given a single final good.

6. For long-run stability properties of this model please refer to Section 3.

7. Note that

$$
e^{\int_0^t \left(\frac{\varepsilon}{\alpha} \left(\frac{\dot{q}}{q} + \delta \right) - \delta \right) d\tau} \;=\; e^{\int_0^t \frac{\varepsilon}{\alpha} \frac{d\ln q}{d\tau} d\tau + \left(\frac{\varepsilon - \alpha}{\alpha} \right) \delta t}
$$

$$
=\; e^{\frac{\varepsilon}{\alpha} \ln \frac{q(t)}{q(0)} + \left(\frac{\varepsilon - \alpha}{\alpha} \right) \delta t}
$$

$$
=\; \left(\frac{q(t)}{q(0)} \right)^{\frac{\varepsilon}{\alpha}} e^{\left(\frac{\varepsilon - \alpha}{\alpha} \right) \delta t}
$$

Appendix A

We show in this annex it is real prices that matters in our model, and that gains from capital price appreciation can be ignored, given that we have a single final good. In nominal terms the firm solves the following optimization problem

$$\max \hat{p}(t) Y - \hat{r}_k(t) K - \hat{q}(t) R \qquad (59)$$

subject to the technological constraint:

$$Y = K^\alpha R^{1-\alpha} \qquad (60)$$

where $\hat{p}(t)$, denotes the nominal price of output Y, and $\hat{r}k$ (t) and $\hat{q}$ (t) denote the nominal renta price of capital K and the nominal price of the nonrenewable R at time t, respectively. The firs order conditions of the firm are given by

$$\alpha \frac{Y}{K} = \frac{\hat{r}_k}{\hat{p}} \qquad \text{and} \qquad (1-\alpha)\frac{Y}{R} = \frac{\hat{q}}{\hat{p}} \qquad (61)$$

manipulating this expression we obtain

$$Y = \frac{\hat{r}_k}{\hat{p}}\frac{K}{\alpha} = \frac{\hat{q}}{\hat{p}}\frac{R}{(1-\alpha)} \qquad \text{or} \qquad K = \frac{\alpha}{(1-\alpha)}\frac{\hat{q}}{\hat{p}}\frac{\hat{p}}{\hat{r}_k}R \qquad (62)$$

Substituting for K from (62) into (60) we get

$$Y = \left(\frac{\alpha}{(1-\alpha)}\frac{\hat{q}}{\hat{p}}\frac{\hat{p}}{\hat{r}_k}\right)^\alpha R \qquad (63)$$

equating this last expression to Y from (62) we get a relation of nominal prices as follows

$$\alpha^\alpha (1-\alpha)^{1-\alpha} = \frac{\hat{r}_k^\alpha \hat{q}^{1-\alpha}}{\hat{p}^\alpha \hat{p}^{1-\alpha}} \qquad (64)$$

Let us use the current price level of output ($\hat{p}$ (t)) as deflator, as is customary (e.g., Lucas and Rapping (1970) or Blanchard (2003)). We thus define $r \equiv \frac{\hat{r}_k}{\hat{p}}$ and $q \equiv \frac{\hat{q}}{\hat{p}}$, where r and q denote the real rental price of capital and the real price of the nonrenewable resource, respectively. Then, substituting for r and q in (64) we get $\alpha^\alpha (1-\alpha)^{1-\alpha} = r^\alpha q^{1-\alpha}$. Therefore the rental rate of capita (the real rental price of capital) can be expressed as a function of the real price of the nonrenewable q as follows

$$r = \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}}\right)^{\frac{1}{\alpha}} \qquad (65)$$

In nominal terms the extracting sector solves the optimization problem $\max\{\int_0^\infty \hat{q}Re^{-\int_0^t \hat{i}(\tau)d\tau}dt \mid \int_0^\infty Rdt \leq S_0\}$ where $\hat{i}$ is the nominal interest rate (note that when working in nominal terms the correct discount factor for the firm's problem is the nominal interest rate of the market). The first order conditions for this problem imply $\hat{q} = \hat{\lambda}e^{\int_0^t \hat{i}(\tau)d\tau}$ and $\dot{\hat{\lambda}} = 0$ (here $\hat{\lambda}$ is co-state variable). Further manipulation of the first order conditions of the extracting sector leads to (by taking the time derivative of ˆq and by applying the Leibniz's rule):

$$\frac{\dot{\hat{q}}}{\hat{q}} = \hat{i}(\tau) \tag{66}$$

we have that the nominal interest rate ˆı (τ) equals $\hat{i}(\tau) = \frac{\hat{r}_K}{\hat{p}} + \frac{\dot{\hat{p}}}{\hat{p}} - \delta.$ That is, the nominal interest rate equals capital gains plus gains from the capital price's appreciation minus the depreciation rate of capital. Since by definition $\hat{q} = q\hat{p}$ then taking the log time derivative of ˆq we get:

$$\frac{\dot{\hat{q}}}{\hat{q}} = \frac{\dot{q}}{q} + \frac{\dot{\hat{p}}}{\hat{p}} \tag{67}$$

substituting this into (66) we get $\dot{q}/q = r - \delta.$ That is, the real price of the nonrenewable resource grows at real interest rate. We therefore, using (65), can express the representative firm's first order conditions in terms of a differential equation in q (the real price of the nonrenewable resource) which is given by

$$\frac{\dot{q}}{q} = \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}}\right)^{\frac{1}{\alpha}} - \delta \tag{68}$$

where only real prices are relevant.

Appendix B

Here we show that $q(0) = \left(\frac{1-\alpha}{\alpha-s}\right)\frac{K_0}{S_0}.$ Note that the resource constraint that the total amount of extractions $\left(\int_0^\infty R(t)\,dt\right)$ must equal the initial stock of the non-renewable S0 can be rewritten as

$$\int_0^\infty R(t)\,dt = \frac{1-\alpha}{\alpha} \int_0^\infty \frac{r(q)}{q} K_0 e^{\int_0^t \left(\frac{s}{\alpha} r(\tau) - \delta\right) d\tau}\,dt = S_0 \tag{69}$$

Since $r = \left(\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{q^{1-\alpha}}\right)^{\frac{1}{\alpha}}$ and by $\frac{\dot{q}}{q} = r - \delta$ (69) can be rewritten as

$$\int_0^\infty q(t)^{-\frac{1}{\alpha}} e^{\int_0^t \left(\frac{s}{\alpha}\left(\frac{\dot{q}}{q}+\delta\right)-\delta\right)d\tau}\,dt = \frac{1}{(1-\alpha)^{\frac{1}{\alpha}}} \frac{S_0}{K_0} \tag{70}$$

Note that

$$e^{\int_0^t \left(\frac{s}{\alpha}\left(\frac{\dot{q}}{q}+\delta\right)-\delta\right)d\tau} \quad = \quad e^{\int_0^t \frac{s}{\alpha}\frac{d\ln q}{d\tau}d\tau + \left(\frac{s-\alpha}{\alpha}\right)\delta t}$$

$$= \quad e^{\frac{s}{\alpha} \ln \frac{q(t)}{q(0)} + \left(\frac{s-\alpha}{\alpha}\right)\delta t}$$

$$= \quad \left(\frac{q(t)}{q(0)}\right)^{\frac{s}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t} \tag{71}$$

Substituting (71) into (70) we get

$$\frac{1}{q(0)^{\frac{s}{\alpha}}} \int_0^\infty q(t)^{\frac{s-1}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}\,dt = \frac{1}{(1-\alpha)^{\frac{1}{\alpha}}} \frac{S_0}{K_0} \tag{72}$$

Claim

$$\int_0^\infty q(t)^{\frac{s-1}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}\,dt \quad = \quad \left. \frac{q(t)^{\frac{s-\alpha}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}}{(s-\alpha)(1-\alpha)^{\frac{1-\alpha}{\alpha}}} \right|_0^\infty$$

$$= \quad \frac{q_{ss}^{\frac{s-\alpha}{\alpha}} \lim\limits_{t\to\infty} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t} - q(0)^{\frac{s-\alpha}{\alpha}}}{(s-\alpha)(1-\alpha)^{\frac{1-\alpha}{\alpha}}}$$

$$= \quad \frac{q(0)^{\frac{s-\alpha}{\alpha}}}{(\alpha-s)(1-\alpha)^{\frac{1-\alpha}{\alpha}}} \tag{73}$$

Since this limit must exist we impose that $s < \alpha$.

Proof. It suffices to show that

$$\frac{d\left(\frac{q(t)^{\frac{s-\alpha}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}}{(s-\alpha)(1-\alpha)^{\frac{1-\alpha}{\alpha}}}\right)}{dt} = q(t)^{\frac{s-1}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t} \tag{74}$$

Taking the time derivative we get

$$\frac{d\left(\frac{q(t)^{\frac{s-\alpha}{\alpha}}}{(s-\alpha)(1-\alpha)^{\frac{1-\alpha}{\alpha}}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}\right)}{dt} = \frac{q(t)^{\frac{s-\alpha}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}}{(s-\alpha)(1-\alpha)^{\frac{1-\alpha}{\alpha}}} \left(\frac{s-\alpha}{\alpha}\frac{\dot{q}}{q} + \left(\frac{s-\alpha}{\alpha}\right)\delta\right)$$

$$= \frac{q(t)^{\frac{s-\alpha}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}}{\alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}}} \underbrace{\left(\frac{\dot{q}}{q} + \delta\right)}_{r}$$

$$= \frac{q(t)^{\frac{s-\alpha}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t}}{\alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}}} \left(\frac{\alpha^{\frac{\alpha}{\alpha}}(1-\alpha)^{\frac{1-\alpha}{\alpha}}}{q^{\frac{1-\alpha}{\alpha}}}\right)$$

$$= q(t)^{\frac{s-1}{\alpha}} e^{\left(\frac{s-\alpha}{\alpha}\right)\delta t} \tag{75}$$

Substituting (73) into (72) we get

$$q(0) = \frac{K_0}{S_0}\left(\frac{1-\alpha}{\alpha - s}\right) \tag{76}$$

Appendix C

Firstly, if $r \to \infty$ and $\rho > 0$ we have that (44) becomes

$$\lim_{r \to \infty, \rho > 0} q = \lim_{r \to \infty, \rho > 0}\left(\frac{(1-\alpha)^{\frac{1}{1-\rho}}}{1 - \frac{\alpha^{\frac{1}{1-\rho}}}{r^{\frac{\rho}{1-\rho}}}}\right)^{\frac{1-\rho}{\rho}} = (1-\alpha)^{\frac{1}{\rho}} \tag{77}$$

that is q would be a constant in the long run contradicting that $\frac{\dot{q}}{q} > 0$. Now if $r \to \infty$ and $\rho < 0$ then applying L'Hôspital's rule to (44) we have

$$\lim_{r \to \infty, \rho < 0} q = \lim_{r \to \infty, \rho < 0} \frac{(1-\alpha)^{\frac{1}{\rho}} r}{\left(r^{\frac{\rho}{1-\rho}} - \alpha^{\frac{1}{1-\rho}}\right)^{\frac{1-\rho}{\rho}}} = \lim_{r \to \infty, \rho < 0} -\frac{\alpha^{\frac{1}{1-\rho}}(1-\alpha)^{\frac{1}{\rho}}}{\left(r^{\frac{\rho}{1-\rho}} - \alpha^{\frac{1}{1-\rho}}\right)^{\frac{1}{\rho}}}$$

$$= -\frac{\alpha^{\frac{1}{1-\rho}}(1-\alpha)^{\frac{1}{\rho}}}{\left(-\alpha^{\frac{1}{1-\rho}}\right)^{\frac{1}{\rho}}} \tag{78}$$

This also implies that q is constant in the long run (even perhaps a complex number) contradicting $\frac{\dot{q}}{q} > 0.$ Secondly, if $r \to 0$, then $\frac{\dot{q}}{q} = -\delta$, which contradicts $\frac{\dot{q}}{q} > 0.$ Thus the only admissible way for q to be infinite is when $r = \alpha^{\frac{1}{\rho}}.$

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Long Run Profit Maximization in Turkish Manufacturing Sector

Önder Hanedar
Dokuz Eylül University

Elmas Yaldız
Izmir University of Economics

Özgül Bilici
Dokuz Eylül University

Onur Akkaya
Dokuz Eylül University

The equilibrium concept is the most important subject for economic theory. The importance of this concept arises in determination of functional structures of the economic variables. Jenkinson (1986) has estimated the long term labour demand function and rationalisation mechanism by using co-integration technique. By focusing on different aspects of rationalisation mechanism in the long run and time series econometrics in formulating and testing this relationship, ACMS (Arrow, Chenery, Minhas, Solow), CES (Constant Elasticity of Substitution) Production Function and co-integration technique are to be employed in this research in particular.

The purpose of this research is to investigate whether the long-run equilibrium implied by profit maximization is valid for the Turkish manufacturing industry for the period of 1950-2001 or not. During this period, Turkish economy has undergone important structural changes, for example the implementation of liberalization policies after 1980s. Thus, the possible effects of economic policy implementation over the profit maximization in the Turkish Manufacturing sector will also be studied by using new time series techniques such as Zivot and Andrews(1992) unit root test and Gregory-Hansen (1996) co-integration tests. Because most of the previous studies about this issue are concentrated in developed countries and there has been little research on Turkish manufacturing sector, this study's contribution is important.

Introduction

Much of the economics theory is based on equilibrium and optimization concepts. These concepts are the most important issues to test economic theory empirically. These concepts are of great importance in neo-classic theory particularly.

This study will investigate whether the long run equilibrium implied by profit maximization is valid for Turkish manufacturing sector for the period of 1950-2001. In this paper, profit maximization relationship will be constructed by neo-classic labor theory. Therefore, the function to be estimated must include real wage and average labor productivity variables. Empirical analysis will be carried out applying co-integration techniques for real wage and average labor productivity. During this period, Turkish economy has undergone important structural changes, for example the implementations of liberalization policies after 1980s. It is evident that the structure of the variables may be affected by economic policy implementations in this period that caused some structural changes. To understand the possible effects of economic policy implementations over the profit maximization in the Turkish Manufacturing Sector, the methodology of structural break will be employed. A break can change the order of integration of the series. Zivot and Andrews (1992) unit root test and Gregory-Hansen (1996) co-integration tests are the tests that take into account the break in the data.

The paper proceeds as follows. Section one presents the derivation of the profit maximization model to be estimated in the empirical part. Section two includes a brief literature review of profit maximization. Section three sets out the econometric methodology used. The data and empirical results are presented in section four. The empirical analysis showed that co-integrating relationship is failed between wage and productivity in Turkish manufacturing sector.

Quantitative Methodology

A production function, summarizing the process of conversion of factors into a particular commodity, can be classified in two groups as homothetic and non-homothetic. The main reason of this distinction is whether a constant elasticity substitution is along a ray, expansion path. But our interest is the first one. We can illustrate Cobb-Douglas, CES and VES type of production functions as example of homothetic production functions. Cobb-Douglas is a production function that elasticity of substitution is unity and factor income shares are independent of relative factor prices. CES (Constant Elasticity of Substitution) production function assumes no variable returns and elasticity of substitution through the production surface. VES (Variable Elasticity of Substitution) production function has a variable elasticity of substitution along expansion path. (Meyer and Burley; 1972, Kmenta; 1967 and Wolkovitz; 1969)

The Constant Elasticity of Substitution (CES) Production Functions dominates in applied studies. So we will firstly outline the CES and then Profit Maximization procedure and outline how to go from a production function to a profit maximization relationship. It is illustrated the following model,

$$Q = \gamma (\delta L^{-p} + (1-\delta) K^{-p})^{-\mu/p} \qquad (1)$$

In equation 1, L denotes labor, K indicates capital and Q is product. The μ parameter is a measure of the economies of scale, δ is the share parameter, while p determines the degree of substitution. (Heatfield and Wibe;1987 and Doll and Orazem;1984**)**

A firm is considered as a production unit that transforms inputs into output and two factors are employed in the production process. L denotes quantity of labor and K is real stock of capital. Identity 2 illustrates this.

$$Q= f(K,L) \qquad (2)$$

According to neo-classical formulation, the aim of a firm as a decision-making agent is to maximize profit. Therefore, a firm's problem is to determine the amounts of K and L that maximizes profit. In order to get a useful model in the empirical analysis, the profit function would be considered as equation 3.

$$\pi= p \quad (L)-(wL + rK) \qquad (3)$$

The profit-maximization goal can easily be illustrated by taking the derivative of the profit function with respect to L. The first condition of profit maximization is the equality of the 4 to zero and in other words, we can move from the equation 3 to identity 5.

$$d\pi/dL=PQ_L-w=0 \qquad (4)$$

$$Q_L=w/P \qquad (5)$$

In identity 5, Q_L denotes marginal productivity of labor and w/p is real wage. The profit maximization will be realized at the level where the marginal productivity of labor equals to real wage. If we point out that the production function in the equation 2 as a CES Function, the first order condition for profit maximization can be defined as the 6th equation.

$$dQ/dL = ((1-\delta)A^{-p}(Q/L)^{p+1} \qquad (6)$$

If the equation 6 is integrated with 5, the decomposition becomes simply as equation 7,

$$w/p=(1-\delta)A^{-p}(Q/L)^{p+1} \qquad (7)$$

Consequently, taking natural logs of both of sides in the equation 7, we derived an early form of the relationship, as equation 8,

$$Log(w/p)=log((1-\delta)A^{-p})+(p+1)Log(Q/L) \qquad (8)$$
$$\text{and}$$
$$Log(w/p)=a+ vLog(Q/L)^{1} \qquad (9)$$

Empirical part of this paper is constructed by taking into account of the last equation.

Literature Review

Since the mid-eighties, co-integration techniques have become increasingly popular, along with a remarkable amount of work in the time series econometrics, also in calculating labor demand function and measuring profit maximization. The validity of profit maximization condition has usually been tested by using Engle and Granger (1987) two-step method. Jenkinson (1986) and Mc Donald & Murphy (1992) have estimated the long run labor demand function and rationalization mechanism by using co-integration technique. Since Jenkinson's labor demand function failed to verify long run equilibrium, Mc Donald and Murphy verified it with a co-integration vector estimated variables of quantity of labor, capital, output, relative factor price and additionally output effect. Lianos and Fountas (1997) found some powerful proofs on the grounds of long run profit maximization in Greek manufacturing sector by using similar techniques. There are only a few studies on this subject in Turkey. Yamak and Küçükkale (1999) studied 1950-1993 periods and used Johansen co-integration method to test rationalization mechanism in Turkish manufacturing sector. The empirical model in this research based on two variables: real wage and average productivity. They concluded that there is a long run equilibrium relationship between real wage and

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[1] This equation is the reverse form of ACMS type CES function and v represents the $1/\sigma$. (σ) represent the elasticity of substitution, defined as a equation of percentage change in the factor proportion with factor prices is measured by using $1/(1+p)$ formulation. See. Arrow, K.T., H.B.Chenery, B.S.Minhas and R.M. Solow, "Capital-Labour Substitution and Economic Efficiency", American Economic Rewiev, p: 43, 1961, pp.225-250 and the derivation process of the model to be estimated is taken from Yamak and Küçükkale (1997).

average productivity. Considering Lucas Critique, the studies mentioned above are criticized, because they do not take into account the possible effect of structural break. Some other studies like Boug (1999) have used techniques regarding to break. Considering this critique, this study provides an application of Engle-Granger two-step co-integration methodology and also some advanced techniques with respect to structural break.

Econometric Methodology

Fundamentally, Granger (1986) identified that regression constructed with non-stationary time series on the other non-stationary series, generates a spurious regression. But, a situation that a regression did not yield spurious relationship as two series was co-integrated is emphasized in latter work by Engle and Granger (1987). For the first condition of co-integration, we have to determine the integration level of series and the most useful and common way to determine the integration order of the series is unit root tests. Three different unit root tests are employed to test the unit root in this study: namely, the ADF (Dickey and Fuller) (1979), PP (Philips and Perron) (1988) and KPSS (Kwiatkowski, Phillips, Schmidt and Shin) (1992) unit root tests. The null hypothesis for the ADF and PP tests is that the series in question has a unit root whereas the KPSS test has the null hypothesis of level or trend stationarity.

Because Turkish economy has undergone important structural changes, we have to analyze effects of structural breaks on integration and co-integration. Structural breaks potentially cause change in the regression parameters of the model. A structural break can change mean value, trend value or both. The conventional unit root tests erroneously fail to reject the null of unit root for the series, in case of a structural break. Perron (1989) first analyzed the impact of structural breaks on the performance of unit root tests. He showed that standard unit root tests, like the augmented Dickey-Fuller (ADF) test, have dramatically reduced power when the underlying process undergoes a structural break. Zivot and Andrews (1992) criticized Perron's assumption of an exogenous date of structural break and permitted the date of the structural break to be endogenously determined within the model. Because policy implementations in Turkish economy may affect the variables those are used in the study. So we considered contribution of Zivot-Andrews to the unit root methodology.

Therefore, the following testing equation is used;

$$y_t = \mu + \beta t + \delta y_{t-1} + \gamma DU_t + \theta DT_t + \sum_{i=1}^{k} \eta_i \Delta y_{t-i} + \varepsilon_t \qquad (10)$$

In this methodology, *TB* (the time of break) is chosen at the point that minimizes the one-sided *t*-statistic of $\delta = 1$ in equation 10. *DU* and *DT* are dummy variables that capture a break in mean and slope occurring at time TB, respectively. As TB is the break date, and DU = 1 if t > TB, and zero otherwise, DT is equal to (t-TB) if (t>TB) and zero otherwise. The null is rejected if the coefficient is statistically significant.

To determine the long run relationship between Lwr and Lqr, Engle-Granger co-integration method will be employed. The Engle-Granger test has two steps: First estimate the co-integrating regression (in equation 11) that specifies the long-run equilibrium between variables.

$$Lwr_t = c + a \, Lqr_t + e_t \qquad (11)$$

At the second step, e_t is tested for stationarity. If e_t is stationary, the null hypothesis of no co-integrating relationship between Lwr and Lqr is rejected.

The conventional approach of co-integration assumes that co-integration vectors are time invariant. Gregory and Hansen (1996) is an extension of the Engle-Granger test where a unit root test is applied to the residual error from an OLS regression of a co-integrating equation that directly incorporates with the structural break. For that reason, the alternative

hypothesis is that residuals do not contain a unit root and hence there is co-integration with a single unknown break, since the null hypothesis of Gregory-Hansen tests is similar as Engle-Granger method. To test for co-integration in the presence of an unknown structural break, we used the co-integration tests suggested by Gregory-Hansen. There are three types of structural break in Gregory and Hansen approach, a shift in intercept (12), in trend (13) and in both (14) of the co-integrating vector. Gregory-Hansen considered three models allowing structural change in the co-integrating relationship. These models are as follows:

Model 1: Level shift (C)

$$y_{1t} = \mu_1 + \mu_2.\phi_{t\tau} + \alpha^T.y_{2t} + e_t, \qquad\qquad t=1,2,.....,n \qquad (12)$$

y_t and x_t, in the context of our analysis, are the Lwr and Lqr respectively. The dummy variable $\phi_{t\tau} = 1$ *if* $t > [n\tau]$ and 0 otherwise, where the unknown parameter $\tau \in (0,1)$ denotes the (relative) timing of the change point, and [ ] denotes integer part.

Model 2: Level shift with trend (C/S)

$$y_{1t} = \mu_1 + \mu_2.\phi_{t\tau} + \beta t + \alpha^T.y_{2t} + e_t, \qquad\qquad t=1,2,.....,n \qquad (13)$$

Model 3: Regime shift (C/T)

$$y_{1t} = \mu_1 + \mu_2.\phi_{t\tau} + \alpha_1^T.y_{2t} + \alpha_2^T y_{2t}\phi_{t\tau} + e_t, \qquad t=1,2,.....,n \qquad (14)$$

For each τ, above models are estimated by OLS, yielding the residuals e_t. From these residuals, the ADF test statistics and the Phillips' (1987) test statistics $Z_\alpha(\tau), Z_t(\tau)$ are estimated. The breaking point is where the minimum ADF, $Z_\alpha(\tau)$ or $Z_t(\tau)$ statistics is acquired. Next, the null hypothesis of no co-integration is tested by using the smallest values of these statistics in the possible presence of breaks.

Empirical Results
Data

The data set used for the empirical analysis in this paper consists of annual observations extending from 1950 to 2001 on real wage (Lwr) and average labor productivity (Lqr) in the manufacturing sector. The real wage is measured by taking into consideration the identity of payment to employee in the manufacturing sector / total employee and the identity of total value added in manufacturing sector / total employee is used by measuring average labor productivity. Both Lwr and Lqr are measured in real terms and deflated by producer price index. All variables are expressed in TL. Data are obtained from Turkish Statistical Institute (TUIK) and from the Statistical Indicators, 1923-2001.

Unit Root and Co-integration without Break

The first step for co-integration analysis is to test for unit root of the series. There are different tests for unit roots described in the literature. We employed ADF, PP and KPSS tests for checking non-stationarity assumption. Table 1 reports the results of various unit root tests developed by Dickey-Fuller (ADF), by Phillips- Perron (PP) and KPSS (Kwiatkowski, Phillips, Schmidt and Shin). The results are consistent with Real Wage (Lwr) and Average Labor Productivity (Lqr) being integrated of order one, I(1). This situation indicates a difference stationary process (DSP). But the KPSS and other tests results are in conflict in some extent. The KPSS tests some of results signs integration level of series as I(0). Different unit root test results are likely to show us a sign for structural break.

Table.1 Unit Root Tests Results

	Lwr		Lqr	
	Trend	No Trend	Trend	No Trend
ADF	-3.461*(1)	-1.644*(1)	-2.957*(1)	-0.768*(0)
PP	-2.221*(0)	-1.376*(2)	-2.514*(4)	0.753*(10)
KPSS	0.071*(5)	0.944(5)	0.065*(4)	0.912(5)

Note: * denotes unit root at 5% significance level; numbers in parenthesis are optimum number of lags determined according to AIC; critical values are based on MacKinnon (1991). For PP and KPSS tests, numbers in parenthesis are the truncation lag determined according to Bartlett Kernel.

Granger (1981) and Engle and Granger (1987) demonstrated that, if a vector of time series is co-integrated, the long-run parameters can be estimated directly without specifying the dynamics because, in statistical terms, the estimated long-run parameter estimates converge to their true values more quickly than those operating on stationary variables. The tests procedure depends on whether the disturbances are stationary or not.

In brief, our variables satisfy the first condition of the Engle-Granger co-integration method, (they are integrated of the same order). The estimation results of the long run Engle-Granger model are given in the Table 2. Having established that two series under examination are I(1) process, Engle-Granger two stage procedure is postulated. According to Engle-Granger co-integration test result, showed in table 2, there is no co-integration vector between Lqr and Lwr, which means that the profit maximization is not valid for Turkey Manufacturing Sector in the period.[2]

Table. 2. Co-integration Tests Results

$Lwr_t = \beta_1 + \beta_2 Lqr_t$	
β_1	β_2
1.348*	0.724*
R-Squared = 0.9094	CRDW=0.3969

ECM (Error Correction Mechanism)		
$\Delta Lwr_t = \alpha_0 + \alpha_1 u(-1) + \alpha_2 \Delta Lqr_t + lagged \Delta Lwr_t$		
α_1	α_2	k
-0.164**	0.468	1

ADF
-3.0287 (1)**

Note: * denote the rejection of the null hypothesis and ** denote the not rejection of the null hypothesis at 5% level respectively. Critical value are based on MacKinnon (1991) and at 5% significance level are -3.4966; models include constant and no trend; *k* is the lag length used in the test for each series and number of lags are determined according to the AIC and given in parenthesis.

The Structural Break, Unit Root and Co-integration

Perron (1989) admitted the possibility of structural breaks in the series and suggested that the conventional unit root test could fail to reject the unit root hypothesis of non-

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[2] Because u (error term obtained from long run equation) checked for stationarity, it is seen that u has unit root when α=0,05 or u is found as I(1). To test for co-integration error-correction models are fit to the model under study too. As a proof of no co-integration, we can see that the parameter of u(-1) in Error Correction Model is not significance.

stationarity even for series known to be trend stationary with structural break. Zivot and Andrews (1992) criticized Perron's assumption of an exogenous date of structural break and permitted the date of the structural break to be endogenously determined within the model.

Standard ADF tests have revealed the real wage and average labor productivity series in Turkey to be I(1), this paper has questioned this result by permitting one endogenously determined break by using Zivot-Andrews unit root test considering the results of structural change on the ADF test statistic. Table 3 summarizes the result of the Zivot-Andrews test in the presence of structural break allowing for a change in the intercept and trend.

Table.3 Zivot-Andrews Endogenous Break Test Results

	Lwr	Lqr
TB	1981	1980
δ	-0.4288 (-4.0262)	-0.5028 (-4.3188)
θ	-0.1355 (-3.1380)	0.3321 (4.1038)
γ	1.0042 (1.8909)	-1.6478 (-2.4306)
β	-0.0091 (-0.5104)	0.0214 (1.0024)
k	0	1

Note: Critical values at 1%, 5% and 10% significance level are –5.57, -5.08 and –4.82 respectively (Zivot ve Andrews, 1992). k is the lag length used in the test for each series and selected criteria based on AIC. t statistics of the related coefficients are given in parenthesis.

Specially, in our case, the models of Zivot-Andrews were estimated over period from 1950-2001. Each time the appropriate dummy (DU, DT) was employed. The results presented in table, report the minimum t statistics and their corresponding break times. Considering structural breaks in all series, the two variables are found to be I(1) or real wage and average labor productivity series are difference stationary with one endogenous break. In other words, the results from the Zivot-Andrews test confirm the results from the other tests that all series are I(1). According to Table 3 break points seems to coincide 1980 for Average Labor Productivity the year after Turkish Military Coup in 1980, the social rights and wage were restricted in large extent and after the liberalization program and break points seems to coincide 1981 for real wage the year which it, low real wage, is one of the main subject of policy implementations. The main empirical results of this model is that we find general evidence for structural breaks, particularly trend break, causing downward-sloping real wage and upward-sloping average labor productivity during or after in 1980's.

Secondly, we investigate co-integration with break. The power of Engle-Granger test substantially decreased, when there is a break in the co-integrating relationship. To overcome this problem, Gregory-Hansen extended the Engle-Granger test to allow for breaks in either the intercept or the intercept and trend of the co-integrating relationship at an unknown time. As stated by Gregory-Hansen, their testing procedure is of special value when the null hypothesis of no co-integration is not rejected by the conventional tests. Our Engle-Granger test results does not sign a co-movement between our variables, and the possibility of structural break in error term should be used the Gregory-Hansen test to be able to effects of break on co-integration.

Tablo.4. Gregory-Hansen Structural Break Test Results

Model	ADF	TB	Z_t^*	TB	Z_α^*	TB	k
C	-4.994*	1983	-3.722	1983	-24.383	1983	2
C/T	-5.481*	1983	-3.800	1983	-25.798	1983	2
C/S	-5.050*	1983	-3.724	1983	-24.332	1983	2

Note: Critical values at 1%, 5% and 10% significance level are -5.96, -5.72 and –6.45 & -79,65, -68,43 and -63,10 for Z_a respectively (Gregory and Hansen, 1996). * imply that the not rejection of the null hypothesis in the possible presence of breaks at 1%, 5% and 10%, respectively.

The results of the Gregory-Hansen test are represented in Table 4. According to these results, the standard and conventional co-integration approaches have similar results. All models report that the no co-integration is present with a break point at 1983. Consequently, there is no doubt that there is not long run equilibrium between real wage and average productivity due to structural breaks.

Conclusion

This study aims to investigate whether the long-run equilibrium implied by profit maximization is valid for the Turkish manufacturing industry covering the period of 1950-2001. In this period the Turkish economy has experienced important policy changes.

When the rationalization mechanism is tested by Engle-Granger method, no co-movement was found between real wage and average labor productivity. This indicates evidence against neo-classic theory of adjustment between our variables or there is no link between real wage and average labor productivity. Gregory-Hansen indicated that when a shift in parameters takes place, Engle-Granger test may be failed. So the structural break in the co-integration equation is importance in terms of rationalization. In addition to Engle-Granger, Gregory-Hansen test rejected the co-integrating relationship.

The empirical analysis showed that co-integrating relationship is failed between wage and productivity in Turkish manufacturing sector. According to our results, the breaks caused by implementations of 1980's, the period that Turkey could grow at labor productivity and a fall in real wages, affect of co-integration or profit maximization mechanism. Other studies about this issue are concentrated in developed countries and there has been little research on Turkish manufacturing sector, this study would show how policy implementations and 1980's as a period affect the relationship and parameter.

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Convergence in Europe
Empirical Analysis on Two Groups of Countries of the European Union

Eva Jelnikar
University of Ljubljana

Urban Murmayer
University of Ljubljana

This paper examines the hypothesis of conditional convergence within the fifteen countries of the European Union, which became member states before May 2004, and between the groups of the same fifteen member states of EU and the ten countries that became members with the last enlargement.

Basic data input was GDP per capita for all EU countries, proxy variables were savings and depreciation rate. The data consisted of time series for 50 years (1950 – 2000) for EU-15 (old EU countries), while for EU-10 (new member states) the performance in terms of GDP from 1995 to 2007 (predicted values) was analyzed.

The presence of beta convergence among EU-15 countries and EU-15 and EU-10 (new EU members) countries was investigated in the first part of the empirical analysis. Starting with graphical analysis, the growth of GDP for different countries during the studied period was compared to the starting level of GDP. If the points in the graph are negatively correlated, then this is a sign of presence of beta convergence. Afterwards, the presence of beta convergence was tested by using the same but formalized approach, the regression analysis. If the partial regression coefficient for GDP p.c. is positive and statistically significant, then the presence of beta convergence among selected group of countries can be confirmed with statistical certainty. In the last part of the empirical analysis the presence of sigma convergence was tested. This type of convergence can be calculated as standard deviation of logarithms of GDP p.c. in the group of countries. This procedure measures the dispersion around determined average. If the dispersion is decreasing, that means that the countries are becoming increasingly similar to each other, in terms of the GDP p.c., and one can confirm the (sigma) convergence.

In both samples highly statistically significant beta convergence was confirmed. Furthermore, sigma convergence was discovered and proved. This confirms the hypothesis of convergence among the fifteen countries of the European Union in the period from 1950 to 2000. Additionally, convergence of ten EU newcomers to the average level of standards of living in the fifteen countries of the EU in the years from 1995 to 2007 is also discovered. Both confirm the existence of forces of convergence among the member states of the European Union.

One of the main objectives of the European Union is real convergence among the member states. To achieve this goal the EU formed a cohesion policy and backed it up with important structural funds. Those are used to finance projects in less developed member countries, such as improving the infrastructure and educational system and to restructure less perspectives industries. In this paper, the real convergence among old and new member countries was proved, which proves that Europe did not fail to reach one of its basic aims.

Introduction

Before the expansion in 2004, European Union was relatively homogeneous region. However, with the expansion, countries with completely different history and, in the past, different economic systems, joined the relatively homogeneous group. The question is, whether countries of the European will be internally homogenous ever again. And this is the question about the convergence.

The phrase, "economic convergence" means that the variations of economic variables, among the groups of countries and regions, are diminishing. The aim of European Union is a long term convergence of the standard of all countries and regions. In this paper, we will study whether EU is successfully approaching towards reaching this objective.

In this paper, the convergence among »old« EU members (a term EU-15 will be used in the rest of the paper) and among »new« EU members and »old« EU member states was investigated.

In the first part of the research, the theoretical background of the growth theory is presented. The bases of this research area were presented by authors who used the neoclassical growth model, which suggests that convergence will occur, when certain conditions are satisfied. Such convergence guides to the final »steady-state« position of all countries. However, this theory did not entirely explain the phenomenon of convergence, therefore modern, endogenous theories started to come into sight. Such theories consider different variables, which help to explain economic growth and convergence.

In the second part of the paper, the empirical analysis, which investigates convergence in general and convergence in the European Union as well, is explained.

In the third part, the results of the empirical analysis are presented. It was found out whether the convergence in EU15 can be confirmed in the period from 1950 to 2000 and whether the convergence was present between EU15 and new member states of the European Union. The convergence was analysed using graphical analysis and regression analysis, which represented foundation for an analysis of beta and sigma convergence.

Theoretical Background

The basic model which explains convergence among countries is neoclassical growth model, which was designed and explained by Solow (1956). This model assumes that countries with different economic parameters will, after a certain time, reach equivalent levels of income per capita and therefore converge to the same level of economic development.

The basic equation of this model is:

$$k'(t) = s \cdot f(k(t)) - (n + m + \delta) \cdot k(t),$$

The first variable of the equation, *k'(t)*, represents the change of the capital per unit of the effective labour. *sf(k(t))* represents the investment capital per unit of the effective labour, *s* is the savings rate and *f(k(t)* is the total production. The last part of the equation $(n + g + \delta)k(t)$ represents the substitute investments.

The equation above suggests that change in the capital intensity depends on the difference among the total investments per unit of the effective labour and the amount of the substitute investments. That means that the economy of a certain country will approach the equilibrium position, when investment per unit of the effective labour equals the substitute investment. Described equilibrium position is called "the steady state".

In the steady state the capital intensity will not change, because the level of the investment will be just sufficient to keep capital intensity of labour on the same level.

The neoclassical model of economic growth, described above, gives the grounds for investigating convergence among countries. The basic idea of convergence is that the

countries with the lower income will grow faster than those with the higher income, since all countries gravitate to the same steady state. This idea comes from the one of the main characteristics of the neoclassical production function - the assumptions of constant economies of scale and diminishing returns of the capital. The returns of the capital are higher in countries that have the lower than average stock of capital. Thus, the economic growth will be higher in the countries that have lower stock of capital (relatively underdeveloped countries).

Two types of convergence are recognized by the economic theory. Those two types distinguish in the assumption whether all countries will eventually reach the same steady state (or not). These two types of convergence are absolute and conditional convergence.

1.   Absolute convergence – the countries with the same stock of capital, the same population growth and the same production function will reach the same level of income (per capita) in the steady state. Described in different words – it is assumed that countries have the same steady states and therefore income differences are consequences of the initial differences in the stock of the capital per unit of the effective labour (Barro, Sala-i-Martin, 1992).

2.   Conditional convergence – in this case, it is assumed that the countries can be positioned in different steady states, which means that the parameters, which describe steady state, can differ among countries. Therefore, different countries will achieve different levels of income per capita in the steady state. Baumol discussed the convergence clubs (as a part of the study, which confirmed the existence of the conditional convergence). Such convergence clubs are formed by countries with similar steady states and as a result, their income per capita converges to the common average of a certain club (Barro, Sala-i-Martin, 1992).

One of the main disadvantages of the neoclassical growth model is, that the steady state growth is determined exogenously (outside the model). As it was already mentioned, capital per unit of the effective labour is constant in the steady state, which means the growth of this category equals to zero. The growth of the production per unit of the effective labor will then also be equal to 0, as it is explained by the equations below:

$$q^* = f(k^*)$$
$$R_q = 0 \; in \; R_k = 0$$

The production per unit of labor equals total production, divided by the population.

$$q = \frac{Q}{L}$$

That means that the output, capital and labor grow at the same level in the steady state. This level can be described as the sum of the population growth and the growth of the technology (as represented by the equation bellow):

$$R_Q = R_K = n + m$$

Additional disadvantage of the neoclassical model is the assumption about diminishing returns of the capital. Romer, one of the early beginners of the endogenous growth theory, proved the presence of growing returns on capital and as a result, it was realized that the neoclassical assumption is no longer the most suitable for explaining growth.

The disadvantages of the neoclassical model caused the emergence of modern theories, which describe the factors that influence economic growth. Among the most famous authors of such theories are Sala-i-Martin, Barro and Temple. The most of the supporters of the endogenous theory agree, that it is not necessary that convergence ise present among more and less developed regions. The main argument are the returns on the capital (that are not necessarily diminishing), as it was described above.

Lucas (1988) considered growing returns of the human capital as one of the most important sources of the economic growth. In the modern world, we are witnessing integrations (such as EU) that cause the migration of the educated workforce from more to less developed regions. Hence, following this theory, it is possible that divergence would occur.

Relevant piece of theoretic work (for studying EU integration) was made by Viner, who suggested that convergence will be present, under the assumption of the workforce mobility, which is initiated by the accelerated international trade – that is opposite to what was forecasted by Lucas.

One of the simplest but also the most famous endogenous models is AK model. This model assumes that savings rates are exogenous and constant, level of technology is unchanged and it is assumed that the returns on capital are constant (instead of diminishing) (Van Den Berk, 2001).

Krugman studied integration convergence from a different perspective. He considered agglomeration and technological spill over as factors which influence convergence. He highlighted that it is cheaper to adapt the technology invented by someone else (imitation) instead of developing it. Therefore those countries, which are able to adapt the technology of the developed countries, will be able to converge, because they will technologically improve quicker than countries which develop the technology by themselves (Van Den Berk, 2001).

Past Studies on Convergence

One of the most important convergence researches was completed by Barro (Barro, 1999). The author used a sample of 98 countries and investigated, whether the relation between economic growth and the initial level of GDP p.c., can be confirmed. He studied period from 1960 to 1985. He refused the hypothesis about absolute beta convergence.

Hypothesis about universal (absolute) convergence was also investigated by Baumol in 1986 (Baumol, 1986). His founding was, that there are no proofs about the presence of absolute convergence, when studying all countries around the world. However, the results were slightly different when studying only a group of similarly developed countries. When he studied convergence on a sample of 16 industrialized countries (period from 1870 to 1979) his regression coefficient amounted to -0,995. Negative regression coefficient suggests that the beta convergence is present, and its value is almost -1, which leads us to the thought that the convergence is almost perfect.

Studies that followed, more or less confirmed Barro's results. Beta convergence of income per capita was confirmed on a sample of 100 OECD countries and as well among some USA states and regions of developed European countries.

Results, which suggested a very strong convergence inside the groups of industrialized countries, inspired Baumol to start thinking about the existence of "convergence clubs". Those are groups of countries that all together converge to a certain level of income per capita. The recognition of convergence clubs, on the other hand, represents a critic of a neoclassical growth model. This is because the combination of the convergence inside the convergence clubs and statistically insignificant convergence between the convergence clubs, leads to the existence of the conditional convergence.

Some studies on convergence among European transition countries were conducted (8 of those transition countries are now full members of EU). In a study made by UN/ECE (UN, ECE; 2000) the presence of beta convergence was confirmed in a period from 1989 to 2000, but only within the group of countries of the Southeast Europe. In the same study, sigma convergence was confirmed among the transition countries of Central Europe. The movement of income per capita among all transition countries was in a period 1989-2000 divergent. In a

group of countries from Central Europe, the divergent motion of income was noticed at the beginning of the transition process (from 1989 to 1991), however the phase of a convergence started straight after this period, and lasted till the end of the studied period (UN/ECE, 2000).

Empirical Analysis of Convergence

In the neoclassical growth model, the most important factors in the convergence analysis are initial income level and growth of income per capita. The negative relation should be present among both variables, which means that countries with lower initial income grow faster (Barro, Sala-i-Martin, 1992).

The empirical analysis on convergence in Europe consists of three parts. In the first part, the presence of beta convergence among old[1] EU members and as well among old and new[1] EU members was investigated with the graphical analysis of initial level of GDP p.c. and the growth of the income, in the studied period. The arrangement of the countries point on a negative correlation, in the case of the convergence of incomes. That means that countries with the lower income in the first period, undergo the higher economic growth.

In the second part of the empirical analysis, the presence of beta convergence was investigated using more formal procedure – regression analysis. If the regression coefficient of the initial level of income per capita is negative and statistically siginificant, the presence of beta convergence in a studied sample can be confirmed.

In the last part, the sigma convergence was investigated. Sigma convergence can be calculated as a standard deviation of the logarithms of incomes per capita in the group of countries. It measures dispersion of the values around certain average. In the case, sigma convergence is present providing that the dispersion of the income per capital will decrease. For the purpose of the better presentation of the results, the standard deviations for the logarithms of the income per capita will be illustrated graphically.

Expected Results

Following the neoclassical growth theory, convergence will be present only among countries with similar values of parameters that define steady state. Because of the different levels of savings rate, two countries will be positioned in different steady states. Therefore it is not necessary that the country with the lower level of income per capita will grow faster, but the growth of the capital will depend on specific steady state of the certain country. Taking into account the fact, that the savings levels among EU member differ, the convergence should not be expected, strictly followed the predictions of the neoclassical growth theory.

Following newer, endogenous growth theories, which include additional variables, it could be expected that the convergence will occur among EU members. This is because the integration process improves the trade openness increases and the education, mobility of the population also progress. With the EU Agendas, it was determined that one of the main aims of the integration is a long term convergence of standards of all countries and regions inside the integration. EU fights for the convergence with the cohesion funds, which cause the rearrangement of the assets from the more developed to the less developed regions. Hence we can expect that it will have a positive influence on convergence.

Former socialistic countries which form the group of new EU members (except Cyprus and Malta) started the path of the market economic system in 90's of the last century. Transition represented very turbulent period. In fact those countries had to implement new economic system on the grounds of old, socialistic system. This caused the closure of many

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companies, which were not able to compete in the new system. It is obvious that crumbling of the companies causes the increase of the unemployed.

The closure of many companies was evident on an aggregate level as well; the former socialist countries recorded substantial negative levels of economic growth during the first years of transition.

Slovenian GDP reached its lowest point from the start of the transition process, in the year 1992. In 1992, it amounted 80% of the value in 1989. Slovakia's GDP has been declining even one year more and reached the lowest point of 80% of the GDP before the transition process. Slovakia, together with the Czech Republic, was among those countries, whose GDP fell the most. Some countries, for example Poland, started growing already in the year 1991.

As a result of the mentioned negative economic growth in the first years of the transition, the countries firstly had to catch up with what they have lost, only after that process, the converging to the average European income could have started. Up to the year 1999, the most of the transition countries (with the exception of Czech Republic) cached up with what they have lost in the first few years of transition. Some countries (Poland for example) were even faster in this process. Polish GDP in the year 1999 was 20% higher from their GDP in 1989.

West European countries (that are used as a benchmark in this paper), did not experience the similar process as described above. They followed the "normal" path of the GDP growth, therefore it can be expected that the period of 90's was a period of divergence or widening the gap of the differences in the levels of the incomes per capita among European countries.

Once East European countries overcame the biggest transition crisis, relatively fast (comparing to the Western European countries) economic growth has begun. The basic theory about absolute convergence suggests that countries with lower GDPs in the initial position grow faster. In accordance with neoclassical growth theory, fast economic growth is justified with the same steady states that all countries converge to (and different initial positions in terms of the GDP p.c.).

It can be expected that the initial GDP p.c. will have the biggest influence on the economic growth, which is in compliance with the endogenous growth theory. Underdeveloped countries benefit more, with the access to the bigger technological area, which is provided with the economic integration. The expectation is, that with this empirical analysis, it will be proved that the convergence is present among countries of the European Union.

Empirical Analysis

As stated in the beginning of this chapter, the presence of convergence in Europe was tested in this paper in three steps. First, we analyzed the convergence graphically. In the second part we used basically the same procedure just that it was more formal – it was done with the regression analysis. In the last, third step the presence of convergence among the countries in the sample was analyzed with the test of sigma convergence.

Analyzed Data

The subject of the analysis in the first part was to discover and analyze convergence among "old" members of the European Union (EU15) in the period from 1950 to 2000. Nevertheless the fact that in the 1950 European Union was constituted only of six member states, this year was used as the base year in the research of the convergence among the European countries.

The subject of the analysis in the second part was to discover potential convergence among two groups of countries, the "old" (EU15) and "new" (EU10) member states of the European Union, in the period from 1995 to 2007. The span from 1995 to 2007 was used because the new member states to the European Union became independant in the begging of 90's. First years of independence were the times of big economic difficulties and changes and it was therefore not reasonable to expect any convergence. For this reason year 1995 was used as the base year. In order to have the time span long enough, data until 2007 was used in the analysis, where the last three years were estimates calculated by European Statistical Office, Eurostat.

In the analysis of the convergence among "old" member states, the data for GDP per capita in American dollars in constant prices (Laspeyres index) was used for all years in the period over 1950 to 2000. In the second part the data on GDP per capita is given as a share of the GDP per capita of each new member state in the average GDP per capita in the EU15. This means that GDP per capita of a "new" member states is given as an index number, where EU15 equals 100[1].

Savings as the share of GDP per capita and population in absolute numbers were also used as the explanatory variables in the analysis of the convergence; for the period from 1950 to 2000 in the first part[1] and from 1995 to 2007 in the second part. Two more explanatory variables were used; growth of productivity and the depreciation rate. For both fixed values were used and were the same for all the countries; that is 0.05 for the growth of productivity and 0.075 for the depreciation rate.

Graphical Analysis of the Convergence Among the EU10 and EU15 Countries

In the first step the existence of the convergence was tested graphically where the logarithms of GDP per capita in the base year (that is 1950 or 1995) were shown on the x-axis, whereas y-axis shows logarithms of the growth of the GDP per capita over the period from 1950 to 2000 in the case of group EU15 and from 1995 to 2000 in the case of EU10.

Graph 1: Scatter plot that shows connection between the income per capita in the first year (1950) and the growth of it over the examined period.
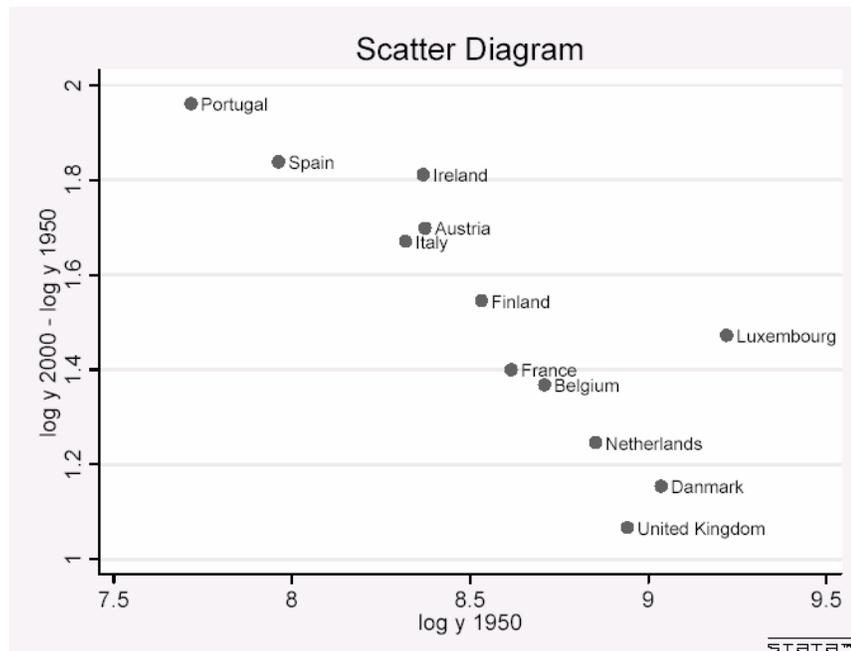
One can see from the graph above that the EU15 member states lay nicely around the negatively slopped line. This means that the relation between the level of income in the first observed year and the growth of the GDP per capita over the observed year is negative. This is the first sign of the presence of convergence in the group of EU15.

Graph 2: Scatter plot that shows connection between the income per capita in the first year (1995) and the growth of it over the examined period.
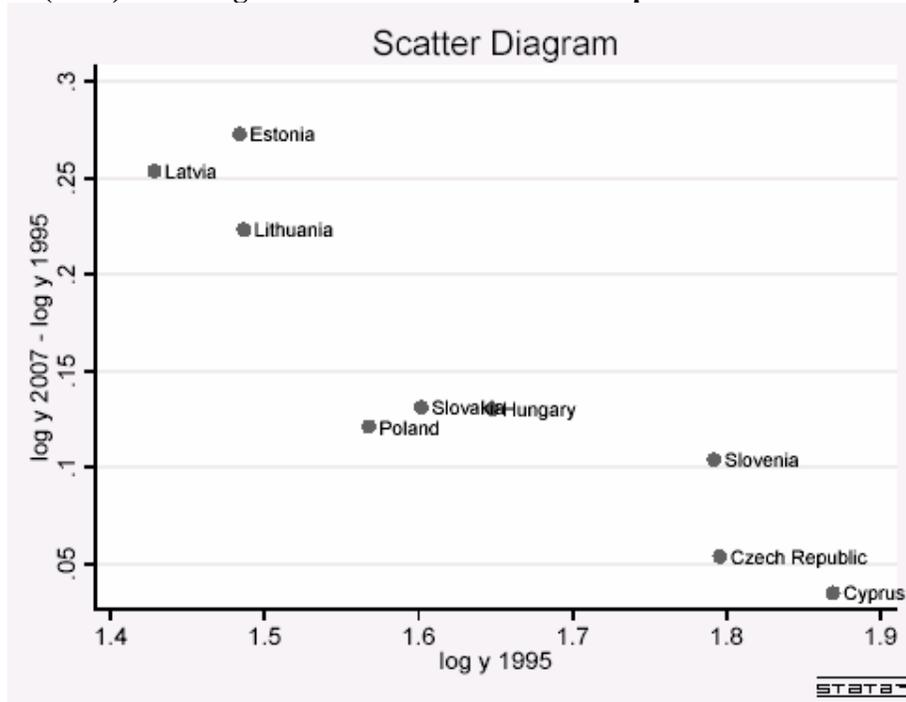
Source: Eurostat, 2005; Own calculations

Findings are similar when analyzing the convergence between the EU15 and EU10. As one can notice from the graph above, the relation between the categories on both axes is negative. This means that countries which started the development with the higher level of income per capita grew more slowly over the examined period compared to the countries starting with the lower income per capita.

Besides that, countries examined in this part of the analysis could be divided into three groups that differ in the income per capita in the first year and the pace of growth through the analyzed period.

- Countries with the lowest income per capita in the first year (1995) and the highest growth of GDP per capita over the span from 1995 to 2007. Those countries are Baltic countries, Latvia, Lithuania and Estonia.

- Countries with the medium income per capita in the first year (1995) and the medium growth of GDP per capita over the span from 1995 to 2007. Those countries are Hungary, Poland and Slovakia.

- Countries with the highest income per capita in the first year (1995) and the lowest growth of GDP per capita over the span from 1995 to 2007. Those countries are Slovenia, Cyprus and Czech Republic.

Graph above is in line with the neoclassical theory of growth which suggests stronger growth for countries with lower income per capita in the first observed year – countries in the first group had lower income per capita (e.g. Estonia), but performed better in the terms of the economic growth. Vice versa, countries starting from higher income per capita in the first year (e.g. Slovenia), performed worse in the terms of GDP growth over the observed period. Therefore one can conclude that EU10 countries that joined European Union in 2004 (without Malta) have the same steady state to countries in the group EU15, because EU10 countries were closing the development gap over the observed time and were therefore approaching the income level of the EU15 countries. This also means that all twenty five member states of the European Union form a convergence club (i.e. a group of countries with the same steady state).

Because of the negative relation between both categories on the x- and y-axis, one can conclude that countries from EU15 and EU10 group converged to the same level, which is the average level of development of EU15. It is therefore reasonable to expect convergence also in the second step of the analysis. We expect to prove statistically significant convergence among EU15 and EU10 countries by using the regression analysis.

The analysis of the convergence between EU10 and EU15 by using the regression analysis (Beta convergence)

Second step in the research of convergence in Europe is statistically more formal than the first step, but methodology of analysis is the same – to prove the negative relation between the categories the regression analysis was used.

The regression function tested in the analysis was as follows:

$$\lg y = a + b_1 \cdot \lg dp\_pc\_50(1995) + b_2 \cdot lcsave + b_3 \cdot \ln\_g\_d \,,$$

where *lgy* represents the logarithms of the income per capita, *lgdp_pc_50 (_95)* represents the GDP per capita in the first year, which is 1950 in the first case and 1995 in the second, *lcsave* is the savings rate, whereas *ln_g_d* represents the rate of the substitution investment. For the analysis of the convergence the most important explanatory variable is GDP per capita in the first observed year (that is *lgdp_pc_50 (_95)*.

Regression analysis of the convergence within the group of EU15[1] countries showed that the partial regression coefficient is negative (-0.0185) for the explanatory variable GDP per capita in the first year of observation, that is 1950 (*lgdp_pc_50*). This proves convergence in the span from 1950 to 2000. It also means that the GDP per capita differences diminished over the examined time. The partial regression coefficient *lgdp_pc_50* is statistically significant with the t-statistics of -5.95 and the exact significance of 0.000, which makes it much lower to the marginal level of $\alpha = 0.05$.

The results of the regression analysis of the convergence between the groups of EU10 and EU15 also gave negative partial regression coefficient (-0.046) of the explanatory variable GDP per capita in the first year (1995). Result was, similar to the case examined in the previous paragraph, statistically significant, with the exact significance of 0.000, again much lower to $\alpha = 0.05$.

Both cases lead to the same conclusion: the hypothesis stating that the partial regression coefficient of the explanatory variable GDP per capita in the first year equals zero can be rejected with statistical significance. Therefore one can conclude that the income per capita of the EU15 countries shifted towards the same average and that the EU10 countries converged to the average level of income per capita in the EU15 countries over the examined periods. Both conclusions are supported with the statistically significant results of the regression analysis, that is, the statistically significant negative regression coefficient of GDP per capita in the first year. As the examined dependant variable was growth of GDP per

capita, both results are in line with the basic idea of convergence – countries with lower starting position in terms of GDP per capita grow faster compared to those with the higher income per capita over the examined period.

Conclusions found so far are encouraging for the further analysis. Beta convergence is needed (but not sufficient) prerequisite for sigma convergence. This means that by confirming the existence of beta convergence door is open for the analysis of sigma convergence.

The analysis of the convergence between EU10 and EU15 on the basis of dispersion of income per capita (Sigma convergence)

In the last, third step the presence of the convergence was tested by using standard deviation. Standard deviation measures the dispersion of the income per capita in the group of examined countries over some period of time. If the dispersion of income over the time diminishes the presence of sigma convergence can be confirmed.

In this part the graphs will be used in order to test and prove sigma convergence.

Graph 3: Sigma convergence for EU15 countries over the period from 1950 to 2000
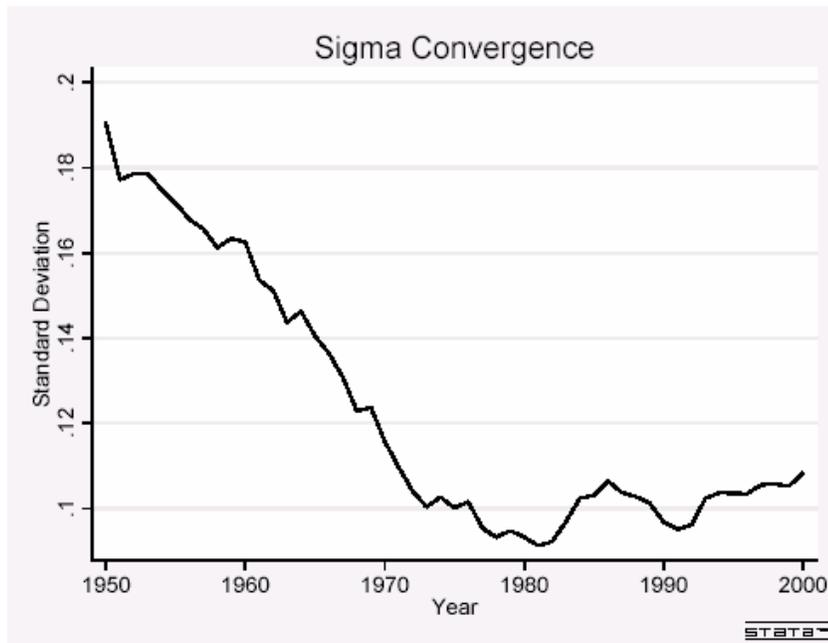
Source: Penn World Tables, 2005; Own calculations

Graph above shows that the standard deviation in the group of countries from 1950 to 2000 was falling. Because standard deviation measures the dispersion of income and consequently the differences in the level of development, one can conclude that the differences among EU15 countries were diminishing, although the dispersion started to rise again in the late 90's. Those were the times when crisis occurred in the certain countries crisis (e.g. Germany, France), on the other hand some of them made a big economic progress (e.g.Ireland).

Graph 4: Sigma convergence between EU10 and EU15 countries from 1995 to 2007
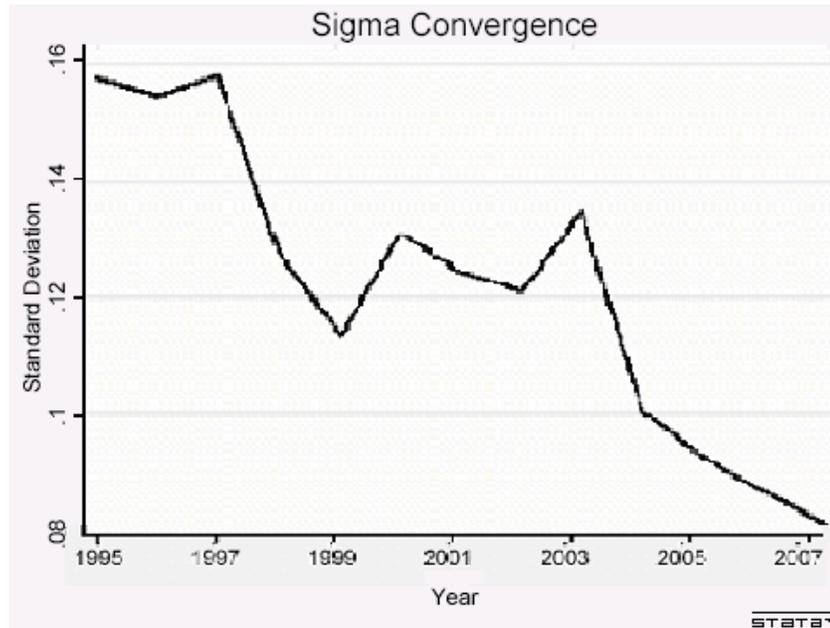
Source: Eurostat 2005; Own calculations

In the Graph 4 one can see that the dispersion in income per capita in the EU10 countries over the period from 1995 to 2007 was reduced – the standard deviation in 1995 amounted 0.16, while it decreased to 0.08 in the last observed year 2007.

In both cases, as seen above, dispersion in income per capita (or standard deviation) diminished over the examined periods. This means that the differences in GDP per capita in the groups of countries EU10 and EU15 were reduced. Said in other words, they converged to same average level. For this reason sigma convergence can be confirmed within the EU15 countries over the span from 1950 to 2000, and between EU10 and EU15 over the years from 1995 to 2007.

Conclusion

The basic idea of the theory of convergence is the idea of faster economics growth of those countries which have lower income per capita in the first year of observation. Idea is based on neoclassical growth theory – this theory assumes that countries in a certain group (also called convergence club) have same steady states. Furthermore, having same steady state means having same income per capita (in the steady state). As developing countries in Europe (e.g. EU10) have an income that is below the average of the EU15, it can be assumed that they have not achieved the steady state yet. And the difference between the steady state and the actual state of the economy (measured in income per capita) is the one generating the economic growth – bigger the difference is, bigger the economic growth will be.

This is just what it was discovered in the case of Europe in this paper – developing countries of the European Union grew faster in the observed period compared to those higher developed countries. Because the economic growth of lower developed countries was faster over the observed span, the development gap was closing over the time.

Convergence was tested and confirmed in this paper among the countries in the group EU15 and among the EU10 group, which over the observed time moved closer to the average level of income per capita in the EU15. Convergence in this paper was tested by two different analytical tools. Using first tool we proved the presence of beta convergence – the economic growth was faster in countries with lower starting level of GDP per capita (the result was statistically significant). In the second part, sigma convergence was proved, which means that the dispersion of income per capita decreased within the observed group of countries.

There are many factors that slow down or accelerate the economic convergence. One of the factors to accelerate the convergence in Europe is the economic integration, the European Union. The fact is that in general economic integrations are positive for the welfare of the countries involved. Consequently this means that the membership in an economic integration and therefore the removal of barriers to trade makes the position of the country involved in the integration better. Besides that, convergence in real terms is the mission that European Union wants to achieve. In order to achieve this goal, member states formed structural and cohesion funds to financially support the idea of convergence among the member states.

The main goal of the cohesion policy is to improve the infrastructure, the educational system, restructuring less perspective industries and to improve the standards of living in general. In the years from 2000 to 2006 a funding of €213 billion was provided to achieve the cohesion goal.

Cohesion funds are based on solidarity of the European countries- the most developed countries pay more into the cohesion funds than get out of it and vice versa for developing countries. The idea is based on the fact that not only the developing countries gain from the cohesion funds, also developed countries (that provide the funds) can utilize from the prosperity and progress in the developing countries.

Summary of Conclusion

Table 1: Summary of results of the empirical analysis of convergence in Europe

BETA CONVERGENCE						
Regression function:						
$\lg y = a + b_1 \cdot \lg dp\_pc\_60(\_95) + b_2 \cdot lcsave + b_3 \cdot \ln\_g\_d$						
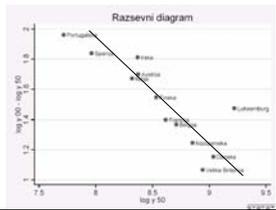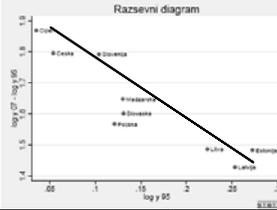
Scatter plot EU15

Scatter plot EU10

	b_1	**Exact significance p**	**Standard deviation**	b_2	b_3
EU-15 (1950 – 2000)	-0.01687	0.000	0.00286	0.01849	0.00890
EU-14 (1950 – 2000) without Luxemburg	-0.01846	0.000	0.00310	0.01866	-0.1059
EU-10 (1995 – 2007)	-0,04647	0,000	0,158	0,01427	0,00779

SIGMA CONVERGENCE		
EU 14	Standard deviation 1950: **0,190**	Standard deviation *decreased* over the period from 1950 to 2000 in the group of countries EU15 by **6.76 percent**.
	Standard deviation 2000: **0,105**	
EU 10	Standard deviation 1995: **0,158**	Standard deviation *decreased* over the period from 1995 to 2007 in the group of countries EU10 by **48.36 percent**.
	Standard deviation 2007: **0,081**	

A general conclusion on the basis of the empirical analysis is that the convergence in Europe was proven in the group EU15 as well as in the group EU10 which converged to the level of development of the group EU15.

The presence of beta convergence was tested and proven by two analytical tools. In the first part the convergence was researched graphically, where x-axis was the level of GDP per capita in the first year of observation and y-axis was the growth of GDP per capita over the time. As expected, in both researched cases (as in the group EU15 and EU10) beta convergence was discovered, because countries with the lower income per capita in the first year grew faster over the time. This relation is therefore negative.

In the second part the same methodology was used, just that the whole procedure was more formal. Based on the regression analysis, the conclusion was the same as in the graphical analysis – the partial regression coefficient GDP per capita was in both cases negative and statistically highly significant. Beta convergence was therefore confirmed, which opened the door for further analysis of the convergence.

In the third step the presence of sigma convergence was researched. On the basis of standard deviation of the logarithms of income per capita sigma convergence was confirmed, because the dispersion of income decreased in both group of countries – calculation showed a 7 percent decrease in standard deviation in the EU15 group over the observed span of 50 years and a 48 percent decrease in the case of EU10 group. This clearly shows the presence of sigma convergence.

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Growth and Development

A Review of ECO Performance with Emphasis on FDI

Lotfali Agheli Kohnehshahri
Tarbiat Modarres University

Sara Emamgholi Poursefiddashti
Tarbiat Modarres University

The ECO[1] (Formerly Regional Cooperation for Development=RCD) was established in 1985 as a trilateral organization of Iran, Pakistan and Turkey to promote multi dimensional regional cooperation to create conditions for sustained socioeconomic growth in the Member States. Following the amendment in the Treaty of Izmir (as the legal framework for the RCD), ECO was fully launched in early 1991. In 1992, the Organization was expanded to include seven new members, namely: Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The date of the Organization's expansion to its present position, 28th November, is being observed as the ECO Day. Over the past 13 years the member states have been collaborating to accelerate the pace of regional development through their common endeavors. Besides cultural and historical interdependence, they have been able to use the existing infrastructural and business links to strengthen their major economic decisions. ECO has started several projects in priority sectors of its cooperation including energy, trade, transportation, agriculture and drug control.

In this study, we evaluate the performance of ECO with emphasis on Foreign Direct Investment (FDI) and propose the appropriate policies for its future. Despite of this reality that ECO members have great similarities, but they are politically disaggregated. We try to consider economic and political factors simultaneously.

Based on formal data in 2004, ECO members had over than 380 million people (almost 6% of world population) that mean a potential market with EU market size. However, the per capita GDP in $US was $1548 that constituted about one-fourth of world average. Also, the unemployment rate in the region was relatively high (5.8%). This trend may be worsening because the average population growth rate (1.7%) is higher than world average. On the other hand, total FDI in the ECO countries was 9 billion dollars in 2004(only 1.4% of total FDI in the world).

So, to appraisal the FDI trends in the ECO countries, we need to consider the main factors affecting FDI. Some of these factors are per capita GDP, exchange rate, openness ratio, inflation rate, external debt and ICRG risk factor.

We will apply the econometric methods (Generalized Least Squares +fixed or random effects) with panel data over the 1992-2005 period. In this regard, the related tests including unit root test, Hausman test, Normality test… will be provided. It is expected that increases in per capita GDP, openness ratio and exchange rate(as devaluation form) will raise FDI, but inflation rate, accumulated external debt ,economic and political risks will decrease the FDI in the region.

Based on our conclusions, ECO members can benefit from their different relative advantages including large market for own and foreigners, tourism, historical and cultural linkages, idle capacities(including young and unemployed people) and various natural resources(mineral and non-mineral resources); and reach to sustainable

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[1]Economic Cooperation Organization

development if they manage their possibilities and potentials; and provide the context to attract FDI without considering some dilemmatic political or religious resistances and pressures.

Introduction

The RCD (Regional Cooperation for Development) was first established in 1985 to promote multi-dimensional regional cooperation and create conditions for sustained socioeconomic growth among its founders, i.e. Turkey, Iran and Pakistan. Later, in 1991, the ECO was replaced for RCD following the amendment of Izmir Treaty. Finally, after collapse the USSR, some CIS members and also Afghanistan were joined to ECO in 1992. So, ECO currently has 10 members including 3 above-mentioned founder countries, Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan; and 28th November is known as ECO day. Over the past decade the member states have tried to exploiting similar cultural and historical characteristics and they have started joint projects in different fields such as energy, trade, transportation, agriculture and drug control.

In this study, we evaluate the performance of ECO with emphasis on Foreign Direct Investment (FDI) and propose the appropriate policies for its future. Despite of this reality that ECO members have great similarities, but they are politically disaggregated. We try to consider economic and political factors simultaneously.

Performance of ECO: Facts and Figures
Population Trends:

ECO members have more than 300 million people currently. Total population has increased from 341 million people in 2000 to 380 million people in 2004. Pakistan, Turkey and Iran have higher people than the other ECO countries and Republic of Kyrgyz has the least population (see figure1). Meanwhile the share of world population has increased from 5.62 percent to 5.98 percent during 2000-2004. Also, the rate of growth of population in the region ant world has been 2.74 percent and 1.16 percent respectively. As we know, the increasing rate of growth of population results in economic, social, cultural and political problems, if the distribution of resources, incomes and opportunities is unequal (Titelbaum, 1974). For example, in economic context, providing the increasing demand for food requires sufficient supply which can provide by domestic production of farm products or through imports them from exporting countries. In addition of food provision, the high rate of population has negative effects on per capita saving, balance of payments, health, infrastructures, education, social and political integration and stability; and over-exploitation of natural resources and environmental degradation.
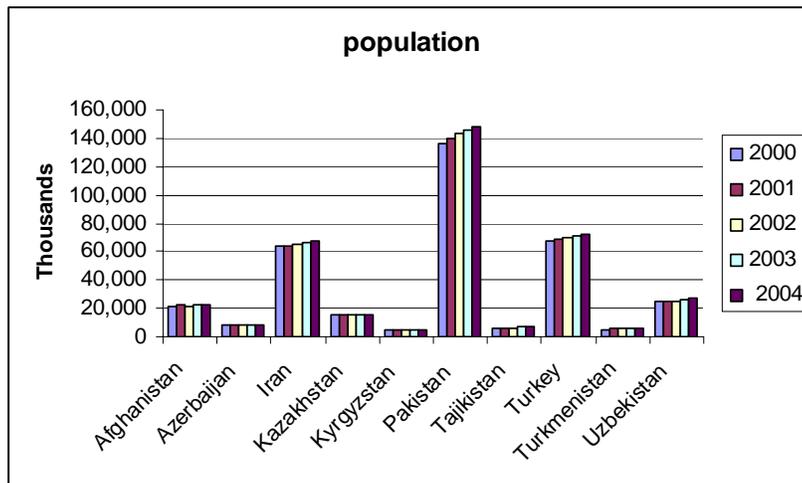
Fig1: the population trends in the ECO

Adult Literacy Rate

We selected this indicator because the literacy level has direct relationship with access to work skills, good social relations, acquisition of scientific and experimental information, attempt to achieve the health standards and so on(Blaug,1970). Thus it can be shown that more literate people have high skills, scientific stock, healthier lives and appropriate interpersonal relations. In the ECO region, most of countries have higher adult literacy rate close to 100 percent especially in the recent years. This fact is obvious from figure 2. The high rates belong to 7 countries independent from FSU (Former Soviet Union). It seems that education system of FSU, despite of deficiencies of the centrally planned regime, has been successful in upgrading the literacy level among different republics. However, this indicator has the lowest rate in Afghanistan(below 40 percent); and this is natural phenomenon for this country because of prolonged wars following the FSU attack to Afghanistan in 1980 and its occupation; and later domestic war resulting from Taliban's governance and existence various armed and paramilitary groups. Among the founder countries of ECO, the situation of Pakistan with adult literacy rate under 60 percent is worse than Turkey and Iran.
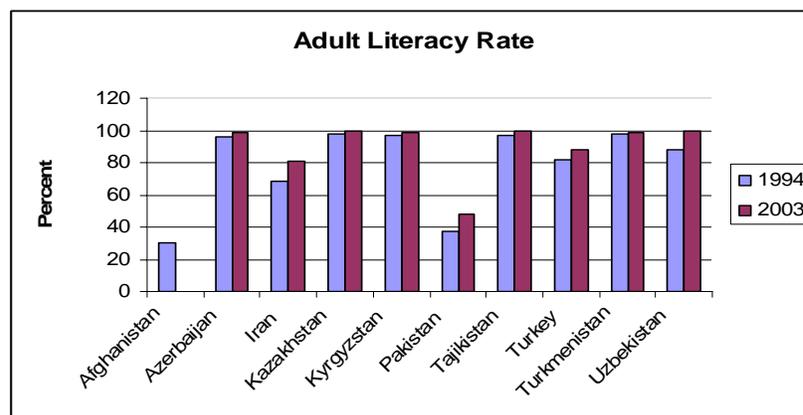
Fig2. Adult Literacy Rate in the ECO

Per Capita GDP

Per capita GDP is an indicator for the overall performance of an economy. It is affected by GDP and population developments. In the ECO, per capita GDP at current prices has increased from 908.4 US$ in 2000 to 1548 US$ in 2004. During this period, the corresponding values for the world have been 5190 US$ and 6321 US$. In recent years, ECO members had different fluctuations in per capita GDP. As shown in fig3, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan have recorded increasing per capita GDP, but Afghanistan, Iran, Pakistan, Turkey and Uzbekistan have volatile per capita GDP. Also, the difference between per capita GDP among above-mentioned countries is considerable, especially when look at Iran's and Turkey's per capita GDP. Despite of this reality that Iran is the net exporter of crude oil in the region, however its per capita GDP in 2004 is close to Kazakhstan's one and very fewer than Turkey's and Uzbekistan's ones.
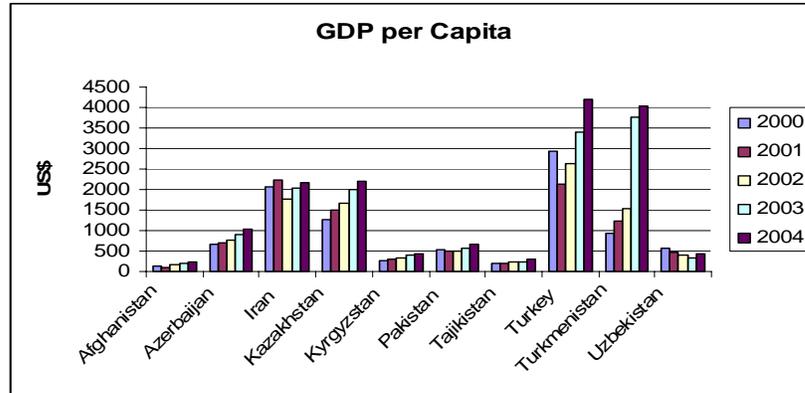
Fig3. Per Capita GDP in the ECO

Industrialization

As shown in fig4, except for Azerbaijan which has petroleum-based industries, the share of industry in GDP is below 50 percent for other countries in ECO. On the other hand, "between" 1993-2004, the importance of industry sector in Azerbaijan, Iran and Turkmenistan has increased, however for the other countries, we find inverse trends. If we divide an economy to 3 sectors including industry, agriculture and services, it can be shown that with changes in one sector share, the other sectors share changes too. So, for example the share of services in GDP for Turkey is more likely high because of its commercial and tourism potentials.
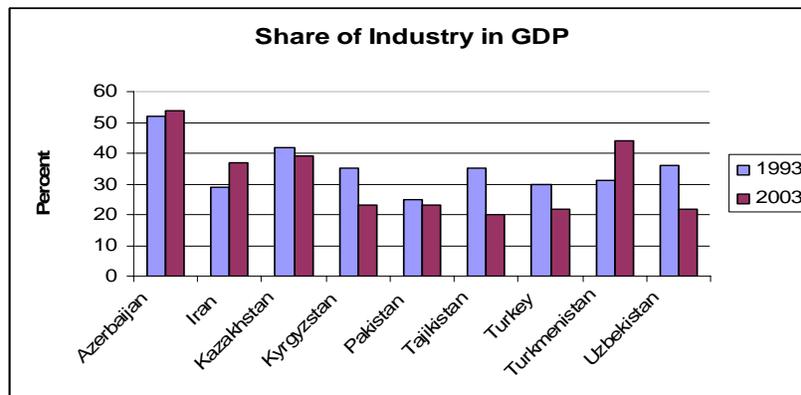
Fig4. The Industrialization trends in the ECO

Agriculture Situation

Agriculture is vital and determinant sector for growth and development of resources-dependent economies including ECO members. ECO countries have large capabilities and potentials in producing of strategic farm products such as wheat, barley, cotton, rice and sugar beet. Based on fig5, Kyrgyzstan has the biggest dependency to agriculture so that the share of its agriculture in GDP is nearly 40 percent. The main point of fig5 is the declining importance of agriculture all ECO countries during 1993-2003, except for Uzbekistan.
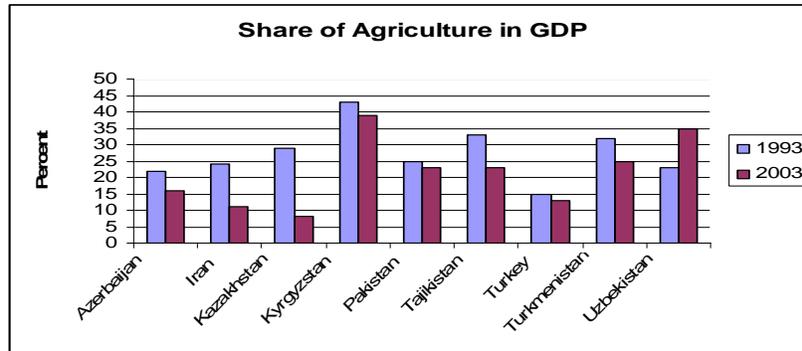
Fig5. The Agriculture trends in the ECO

By comparison two previous figures, we can infer that residual share of GDP in ECO members belongs to services sector.

General Prices Level

Inflation rate as an alarming factor to domestic and foreign investors plays vital role in the economic planning. Hyper inflation results in dropping of national currency value, but mild inflation may be influential in production and investment decisions (Tobin, 1972).

Among ECO members, Turkey had highest inflation rate in 2001, however following the government determination based on omission six zeros from Turkish Lira and other monetary and fiscal policies, this country could curb inflation, so that its inflation rate in terms of changes in consumer prices index(CPI) reached to almost 10 percent in 2004. During 2000-2004, most of ECO countries keep down or fixed the prices level, but some members such as Iran recorded stable 2-digit inflation rate(higher than 15 percent). The other successful countries in this regard are Afghanistan, Tajikistan and Pakistan (see fig6).
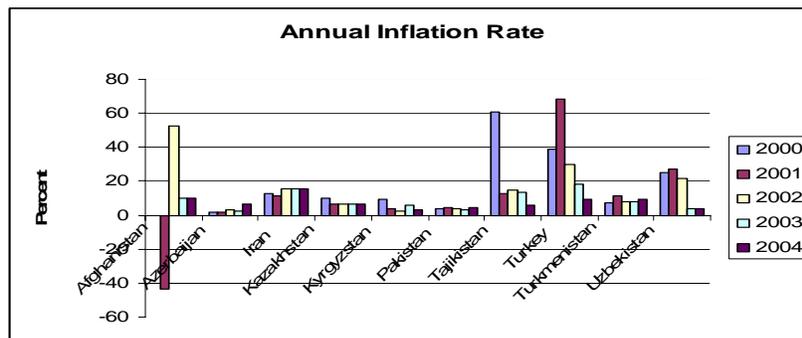
Fig6. The Changes of General Prices Level in the ECO Money Supply

A glance at fig7 indicates the monetization of 3 founder economies of ECO. Iran, Pakistan and Turkey have supplied 80 billion US$, 28 billion US$ and 65 billion US$ money in terms of its second definition, i.e. M1 plus quasi-money in 1998 respectively, but Iran has decreased its liquidity volume in 2003, vice versa Pakistan and Turkey have increased money supply. Comparison of fig6 and fig7 means that expansionary monetary policies in Pakistan and Turkey had positive impacts on economic growth and declining inflation. Another point is pertinent to newly attached countries to ECO. In these countries, monetization is pacing slowly and banking activities are not advanced.
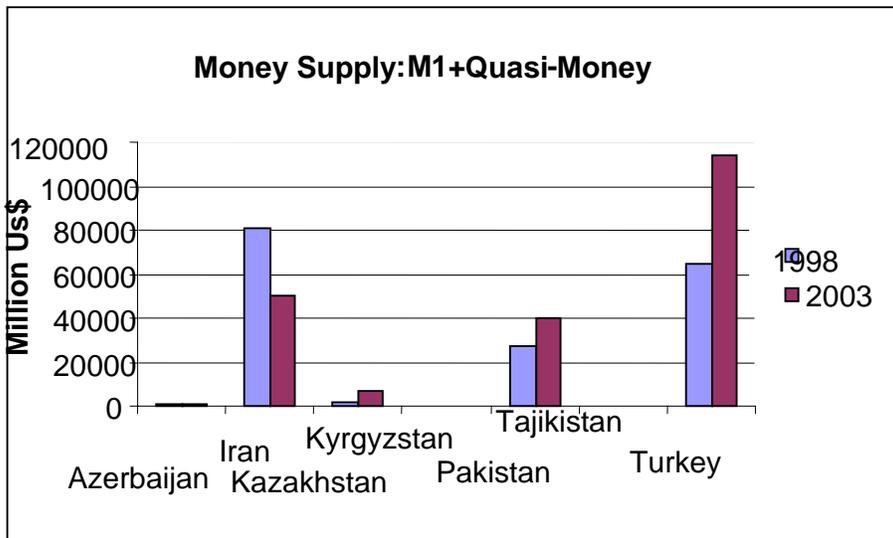
Fig7. Money Supply in the ECO

External Trade

Total External trade as sum of imports and exports of goods and services has continuously grown in the most of ECO countries. The highest total trade volume has belonged to Turkey, so we can regard this country as the most open economy in the region based on 2000-2004 commercial trends. Iran and Pakistan devote the second and third place to themselves in this context. The other members had maximum 20 billion US$ total trade with foreign countries, even total external trade reaches to less than 10 billion US$ in some members (see Fig8).
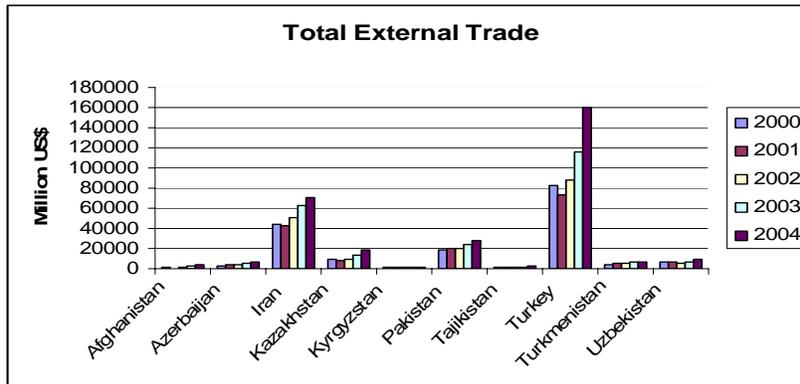
Fig8. Total external Trade Volume in the ECO Balance of Payments

The foreign sector of ECO members can be considered with another look at trade. We can refer to net exports .i.e. exports minus imports as measure for current account component of balance of payments (Bop). Fig9 shows that most of ECO countries except for Turkey had current account deficit in 1998, but this situation has changed so that Pakistan had highest surplus in current account; and Iran and Uzbekistan recorded total surplus in current account below one billion US$. If we ignore the exports of crude oil by Iran, the current account will be negative. On the other hand, Turkey has recorded highest deficit in current account (about 8 billion US$) in 2003.

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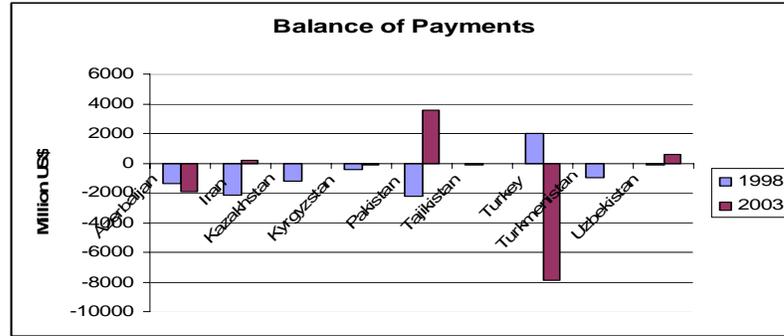
Fig9. Balance of Payments (Current Account) in the ECO

Exchange Rate

The official exchange rate indicates the units of national currency per one unit of foreign currency. Generally, in most of world and regional statistical documents the exchange rates are reported per US$. Based on trade principles, when a national currency is devaluated, i.e. its value is increased per one unit of foreign currency, and Marshal-Lerner elasticity condition holds ($|\varepsilon_X + \varepsilon_M| \succ 1)^2$, we can expect that devaluation results in more exports of national economy (Branson, 1988).

External Debt

High external debt is resultant of long-run domestic and foreign disequilibria. These disequilibria is exaggerated by upward interest rate in the international fiscal markets, the impact of recession on world trade and downward movements in prices of some raw materials which developing countries depend to their exports. The increased fiscal deficit in indebted countries results in decline of domestic investment and high volume imports. So, if accumulated external debt as a fraction of GDP is high, it means the indebted country has many difficulties in debt-service and creating general equilibrium in whole economy (Todaro, 1994). Fig10 indicates that Turkey has the highest total external debt among ECO members, so that its external debt recorded about 160 billion US$ in 2004. Pakistan, Kazakhstan and Iran located in the next ranks of indebtedness to foreign fiscal resources. Therefore, we can argue that when domestic financial assets including national savings and taxes are not sufficient for investment opportunities, the country in question can appeal to borrowing from foreign private or public banks such as World Bank and IMF, provided by manage debt correctly.

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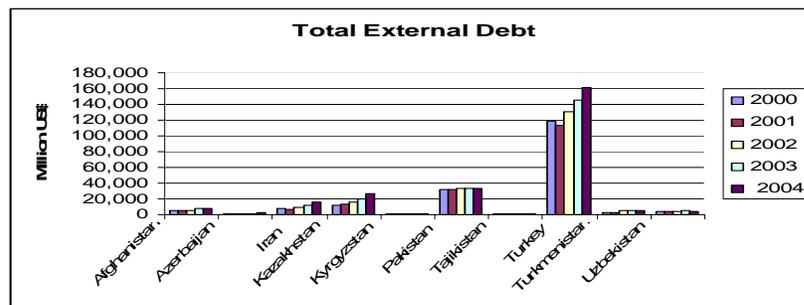
^{2} $\varepsilon_X, \varepsilon_M$ are price elasticity of exports and imports respectively

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Fig10. Total External Debt in the ECO
Table1: Official Exchange Rate (National Currency per US$) in the ECO

Country	Currency	Symbol	2000	2001	2002	2003	2004
Afghanistan	Afghani	AF	67.31	55.73	44.78	48	48.65
Azerbaijan	Azerbaijan Manat	AZM	4,474.20	4,656.40	4,860.80	4,910.80	4,913.60
Iran	Iranian Rial	Rls	8,188	8,008	8,019	8,323	8,793
Kazakhstan	Tenge	T	142.14	146.73	153.41	149.58	130
Kyrgyzstan	Som	Som	47.72	48.45	46.94	43.72	42.67
Pakistan	Pakistan Rupees	Pre/PRs	51.77	58.44	61.43	58.5	59.55
Tajikistan	Somoni	TJS	1.83	2.37	2.76	3.06	2.97
Turkey	Turkish Lira	TL (YTL*)	623,000	1,225,000	1,505,000	1,493,000	1,422,000
Turkmenistan	Turkmen Manat	TMM	5,200	5,200	5,200	5,200	5,200
Uzbekistan	Sum	SUM	236.2	423.31	769.5	971.2	1,051.02

Total Investment

The gross capital formation in each country can employ the idle capacities in different fields and sectors, keep down unemployment rate, increase per capita income, meet high share of domestic aggregate demand and raise the country's exports (Hirschleifer, 1958). The total investment in the ECO members indicates that Turkey, Iran, Pakistan and Kazakhstan have invested considerable amounts in 1995; and this trend has repeated by high amounts in 2003, so that total investment of Turkey and Iran is almost equal. Because of lack of data, some countries investments are not depicted in fig11.
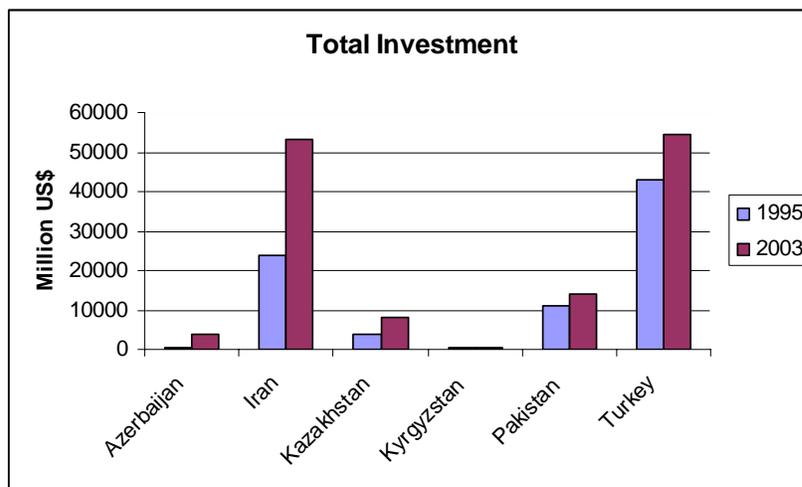
Fig11. Total Investment in the ECO

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Foreign Direct Investment

As we said before, in this paper we focus on foreign direct investment (FDI). In section 3, we discuss the factors affecting on FDI in details. Here, we look at briefly to FDI trends in the ECO members. Azerbaijan, Kazakhstan, Pakistan and Turkey are leading countries in absorption of FDI in the region. However, the other countries including Iran have not used of FDI in large scale during 2000-2004. In Iran, the law of foreign investment recently approved by parliament; also this country has many investment contracts in form of buy-back especially in the oil-related industries.
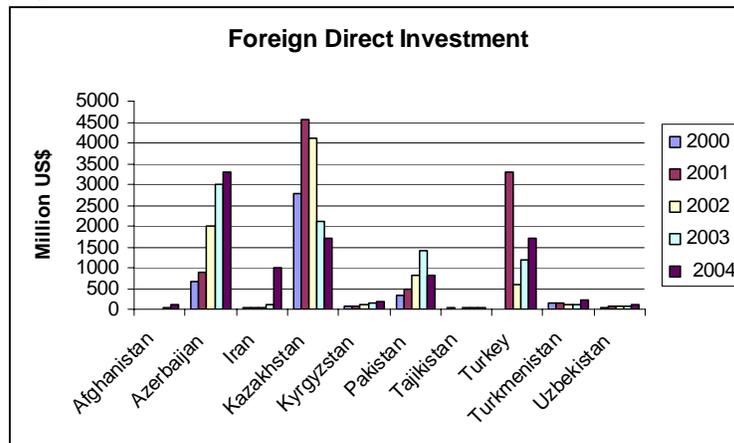
Fig12. Foreign Direct Investment in the ECO

Literature and Theory: FDI

The Eco members integrated to accelerate the free movement of production factors. So, regional economic integration is the first priority in the ECO. The major goals of economic integration are to avoid restrictions and government interventions within the bloc, to relieve cyclical fluctuations, and to increase national income (Balassa, 1961). Also, the major goals of Multinational Enterprises (MNEs) are to produce goods more efficiently and to advance their long-term profitability by undertaking FDI (Dunning, 1997).

Aarle and Skuratowicz (2000) define FDI as any foreign investment that results in a controlling stake of foreigners in a domestic production unit (in contrast with foreign portfolio investment or joint venture capital). FDI takes the form of (i) Greenfield investment, i.e. the establishment of an entirely new production facility owned by foreign firms, (ii) mergers and acquisitions –sometimes called Brownfield investment- especially in the context of privatization.

Theories of FDI can be classified into five subgroups according to different methodological backgrounds: (i) industrial organization, (ii) corporate investment theory, (iii) strategic theory and (iv) portfolio theory, (v) OLI theory. In the industrial organization based theories of FDI firm-specific aspects constitute the main determinants of FDI. Theories based on corporate investment analysis stress the locational determinants of FDI (e.g., the size of the foreign market, the presence of comparatively cheap factors of production, the presence of trade barriers). Strategically motivated theories of FDI concentrate on the interaction with local and international competitors and the desire to gain and maintain local sources of supply. Theories of FDI that focus on portfolio aspects are based on the notion that FDI enables firms to diversify their production and sales risks over more countries.

Dunning (1993) argue that three major sets of advantages determine FDI as OLI theory as follows:

(a) Owner-specific competitive advantages: ownership of tangible or intangible firm-specific assets such as brand name, technology, patent;
(b) Location advantages: large markets, lower transportation and labor costs, lack of import restraints, host government promotional policies, access to foreign consumers and superior infrastructure;
(c) Internalization advantages: intra-firm activity, commercial benefits accruing from FDI.
He refers to linkage between location advantages and host country policies, institutions, and economic conditions. In this regard FDI can be classified into two broad categories:
(a) Market- seeking FDI: tariff jumping and large markets;
(b) Efficiency-seeking FDI: export-platform investment in final goods and in internationally integrated industries in components and intermediate goods.

Firms tend to move to other countries to take specific advantages such as labor-intensive industries that have relatively lower real labor costs (Pain and Lansbury, 1997). Most of the studies of economic integration and FDI have focused on the Europe or European Union (e.g. Yannopolous, 1990; Yamada and Yamada, 1996; Dunning 1997; pain and lansbury, 1997) and NAFTA[3] (e.g.Eden, 1994; Vernon, 1994).

The Static effects of the removal of trade barriers achieved by economic integration could be divided into production and consumption effects, which relate to a shift in the demand for goods produced by member and nonmember countries that modify world production and trade patterns (UNCTC, 1990). The process of economic integration can enhance the location advantages of the markets of member countries by the distribution of location advantages across the markets, and then this enhanced location advantages can provide new opportunities to make more income through the production within the integrated area.

Dynamic effects of economic integration such as economies of scale, cost-production effect,trade-suppression effect, and product efficiency increase competitiveness of member nations derived from larger market size, more opportunities, and large scale economies. These effects result in higher level of income and more investment in research and development (R&D), and improve ownership specific advantages of regional firms (UNCTC, 1990).

UNCTAD considers the rate of growth of country and regional economies as the key variable in the realm of market-seeking component of FDI. The presence of raw materials, either low-cost or skilled labor, and physical infrastructure is important in the realm of resource-seeking FDI. On the other hand, in the field of efficiency- seeking FDI, the existence of regional integration schemes is very important.

Barrell and Pain (1997) argue that European integration has had an important effect on the pattern and level of FDI within Europe and this has been a major vehicle for the impact of competition on productivity. Policies pursued collectively by all European governments have helped to stimulate cross-border investments by firms particularly from inside and also from outside the region. Based on OECD FDI statistics, the stock of FDI as a percent of GDP rose markedly in the four large European economies i.e. Germany, France, Italy, UK, between 1989 and 2000.

Bosworth and Collins (1999) in a comprehensive study survey the effect of capital inflows on domestic investment for 58 developing countries during 1978-95 years. The authors distinguish among three types of inflows: FDI, portfolio investment, and other financial flows (primarily bank loans). They find that an increase of a dollar in capital inflows is associated with an increase in domestic investment of about 50 cents (Both capital inflows and domestic investment are expressed as percentages of GDP).

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[3] North American Free Trade Area

An additional feature of FDI flows is that the share of FDI in total inflows is higher in riskier countries, as measured either by countries` credit ratings for sovereign (government) debt or other indicators of country risk (Razin,2003).

Theories of FDI can essentially be divided into two categories: micro (industrial organization) theories and macro (cost of capital) theories. The early literature that explains FDI in microeconomic terms focuses on market imperfections, and the desire of multinational enterprises to expand their monopolistic power (Caves, 1971). Subsequent literature centered more on firm-specific advantages owing to product superiority or cost advantages, stemming from economies of scale, multi-plants economies and advanced technology, or superior marketing and distribution (Helpman, 1984). According to this view, multinationals find it cheaper to expand directly in a foreign country rather than through trade in cases where the advantages associated with cost or product are based on internal, indivisible assets based on knowledge and technology. Alternative explanations for FDI have focused on regulatory restrictions, including tariffs, quotas, which either encourage or discourage cross-border acquisition, depending on whether one considers horizontal or vertical integrations.

Studies examining the macroeconomic effects of exchange rate on FDI centered on the positive effects of an exchange rate depreciation of the host country on FDI inflows, because it lowers the cost of production and investment in the host countries, raising the profitability of foreign direct investment. The wealth effect is another channel through which a depreciation of the real exchange rate could raise FDI. By raising the relative wealth of foreign firms, a depreciation of the real exchange rate could make it easier for those firms to use retained profits to finance investment abroad and to post collateral in borrowing from domestic lenders in the host country capital market (Froot, 1991).

FDI investors, who gains control of the firm and is endowed with management skills, has proper incentives to pursue proper monitoring of management. Furthermore, based on position of "intangible capital" in the source country, the FDI investor can apply more efficient management standards in the host country compared to domestic. The unique advantage to FDI, that has only recently been explored, is its potential for superior micro-management, based on the specialization in niches of industry in the operation in the source country.

In an integrated capital market, with full information, all forms of capital flows (FDI, loans, and Portfolio equity and debt) are indistinguishable. In the presence of incomplete information, these flows are significantly different from one another.

Shareholders, such as FDI investors, which take control of the firm, and are equipped with managerial know-how, can obtain the full benefits of their actions for themselves and therefore do not face the same free-rider problem.

Competition among potential FDI investors will drive up the price close to the price which reflects the upgraded micromanagement of the firm. The initial domestic owners will gain the rent, which is equal to difference between the FDI investor's shadow price and the initial owner's reservation price. If the competition between potential FDI investors is perfect, all the benefits from the superior FDI management skills accrue to the host economy, leaving the FDI investors with a return on their investment just equaling the world rate of interest. The gains to the host economy from FDI inflows can therefore be classified into two categories. First, there are the conventional gains that stem from opening the economy to the new flow of capital, thereby allowing a more efficient intertemporal allocation of consumption. Second, there are the intrinsic gains associated with the superior micromanagement by FDI investors. The entire gain of the FDI investors is captured by the domestic economy because of assumed perfect competition among these investors over the domestic firms (Razin, 2003).

The economic gains from FDI, relative to portfolio inflows, lie only in the efficiency of investment, since in both cases there are consumption smoothing effects and the same

world interest rate (r) prevails in the host country in the two regimes. In other words, the gains from FDI, in comparison to portfolio flows, do not include the traditional gains from opening up the domestic capital market to foreign capital inflows because these traditional gains are present also in the portfolio regime. Under some plausible conditions the size of the aggregate stock of capital is larger under FDI than under Portfolio equity flows (Razin and Sadka, 2002).

Now, we summarize the main factors affecting on FDI in the following:

1. Market Size: The size of a host economy is measurable by GDP. This indicator which shows locational advantage is a function of industrialization, population and commercialization of economic activities. Generally, GDP is high in the countries in which their economic activities are marketed or pass through marketing. Since a large market results in demand for goods and services provided by foreign investors, so, it may attain to scale economies and is able to decrease transactions and costs (Chandprapalert, 2000).

2. Openness Ratio: One of the main components affecting on absorption the FDI is openness degree of host economy for external trade. In an open economy, the importing of raw materials or some necessary intermediate capital goods for investing and exporting of finished products is easier. So, it is anticipated that economy openness results in positive effect on FDI levels. In the content of openness, we can refer to tax on trade and tariff and non-tariff barriers. These barriers have two dimensional natures. In one hand, when a host country follows an import-substitution strategy, raising tariffs can likely increase the capital inflows. On the other hand, when that country follows an export-promoting strategy, because of possible policies which trade partners adopt in one direction with host country, increasing tariffs can decrease the FDI inflows. Shah and slemrod (1991) in a study of FDI in Mexico, show that FDI in Mexico is highly elastic to difference between tax rates in guest and host countries.

3. Infrastructure Quality: The quality of infrastructure in the host country raises the productivity of investment. This indicator is measured by domestic investment. Indeed, a foreign investor prefers to invest in a country in which infrastructure (such as transport and telecommunication facilities) is strong, because the strong infrastructure will facilitate the distribution of goods and services (Erdal & Tatoglu, 2002).

4. Total Risk: risk is a measure of uncertainty and it can be classified in different kinds. The RSP group, who is responsible for provision of ICRG ratings, classifies the risk into 3 categories: political risk[4], economic risk[5] and financial risk[6]. For example, in the economic field, inflation rate as permanent an irregular increase in the general level of goods and services prices, with creating instability and economic uncertainty, decreases the effective demand or purchasing power in the host economy and impacts negatively on FDI. In reality, the share of FDI in capital inflow of a risky country is small. Another example is external debt of host country. The countries in which external debt is low and ability to debt is high, FDI grows. It can be observed an inverse relationship between FDI and external debt.

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[4] The political risk components are Socioeconomic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religious Tensions, Law and Order, Ethnic Tensions, Democratic Accountability and Bureaucracy Quality.

[5] The economic risk components are GDP per capita, real GDP Growth, annual inflation rate, budget balance as a percentage of GDP and current account as a percentage of GDP.

[6] The financial risk components are foreign debt as a percentage of GDP, foreign debt service as a percentage of exports of goods and services, current account as a percentage of exports of goods and services, net international liquidity as months of import cover and exchange rate stability.

Data and Variables

Based on literature and theory, we first focused on many different variables. The initial sample of country in question was 10 members of ECO. However, because of lack of data about Afghanistan, we omitted this country from our sample. Also, initial study period was 1992-2005, as we proposed in the abstract, but there was the missing data problem for some countries during 1992-1994 and also for 2005. So we had to appeal two available data for 9 members of ECO excluding Afghanistan over the 1995-2004 periods. It must be emphasized that since ICRG ratings have linearity with our principle variables, therefore we separated the common components in the three risk indicators and focused on the 3 independent variables and one dependent variable for our analysis as follows:(In fact we constructed new rating for total risk)

1. **RPERGDP (Real Per Capita GDP)**: this variable is reflects three related variables, (1) GDP that indicates the market size (2) population became as divided GDP to population to get per capita GDP and (3) inflation rate, since the GDP and per capita GDP were in current US \$, we used the US GDP deflator to adjust the nominal values.

2. **OER (Official Exchange Rate)**: since devaluation of OER results in promotion of exports and limitation of imports in the host country and adjust the current account, subjects Marshall- Lerner elasticity we applied two variables as a factor affecting on FDI.

3. **TRISK (Total Risk)**: This variable is based on rating of ICRG. If total risk is high then FDI will be low, so we anticipate a negative relationship between FDI and total risk index.

4. Finally, we considered the **Real FDI(RFDI)** as dependent variable. Here, FDI is adjusted by US GDP deflator because FDI figures were in current US \$.

In data gathering, we used different statistical references:

1. Sesrtcic database of OIC countries;
2. Ecosecretariat statistical website;
3. WDI(2002); and
4. USbudget to provide GDP Deflator.

Model Estimation:

According to the previous paragraphs, we specify the following regression model in implicit form:

$$FDI_{it} = f (RPERGDP_{it} , TRISK_{it} , OER_{it})$$

In which i and t denote to countries and years respectively ($i=1,2,\ldots,9, t=1995,1996,\ldots,2004$). Theoretically, the signs of estimated parameters of 2 first independent variables will be positive and negative respectively, however, the sign of parameter pertinent to OER is ambiguous. This sign depends on domestic trade policies and macroeconomic environment of host countries. We used the 2 first independent variables with one lag because it is supposed that RFDI is affected by real per capita GDP and total risk degree with one year lag, however the official exchange rate is effective on RFDI in the same period. Before the estimation of the model we must to test the stationary of variables. Of course, stationary test is not customary in cross-section data, but in time series and panel data, we have some weak or strong non-stationary. So, for testing the stationary in our panel data we use Breitung(2000) approach. The results of unit root tests for the model variables applying Eviews5 software are reported in Table2:

Table2: Unit Root test Results based on Breitung Approach

Null Hypothesis: Unit root (common unit root process)		
Sample: 1995 2004		
Series: RFDI_AZE, RFDI_IRN, RFDI_KAZ, RFDI_KGZ, RFDI_PAK, RFDI_TJK, RFDI_TKM, RFDI_TUR, RFDI_UZB		
Exogenous variables: Individual effects, individual linear trends		
Automatic selection of maximum lags		
Automatic selection of lags based on SIC: 0 to 1		
Total (balanced) observations: 81		
Cross-sections included: 9		
Method	Statistic	Prob.**
Breitung t-stat	-3.53293	0.0002
Series: RPERGDP_AZE, RPERGDP_IRN, RPERGDP_KAZ, RPERGDP_KGZ, RPERGDP_PAK, RPERGDP_TJK, RPERGDP_TKM, RPERGDP_TUR, RPERGDP_UZB		
Exogenous variables: None		
Automatic selection of maximum lags		
Automatic selection of lags based on SIC: 0 to 1		
Total (balanced) observations: 81		
Cross-sections included: 9		
Method	Statistic	Prob.**
Breitung t-stat	-3.20288	0.0007
Series: TRISK_AZE, TRISK_IRN, TRISK_KAZ, TRISK_KGZ, TRISK_PAK, TRISK_TJK, TRISK_TKM, TRISK_TUR, TRISK_UZB		
Exogenous variables: None		
Automatic selection of maximum lags		
Automatic selection of lags based on SIC: 0 to 1		
Total number of observations: 70		
Cross-sections included: 9		
Method	Statistic	Prob.**
Breitung t-stat	-1.88457	0.0297
Series: OER_AZE, OER_IRN, OER_KAZ, OER_KGZ, OER_PAK, OER_TJK, OER_TKM, OER_TUR, OER_UZB		
Exogenous variables: None		
Automatic selection of maximum lags		
Automatic selection of lags based on SIC: 0 to 1		
Total number of observations: 75		
Cross-sections included: 9		
Method	Statistic	Prob.**
Breitung t-stat	-1.71712	0.043
** Probabilities are computed assuming asympotic normality		

Based on above table, RFDI, RPERGDP and TRISK variables are stationary in the level, however the fourth variable(OER) has unit root in the level which gets stationary with exerting the first difference. So, we estimate the mentioned model using Eviews5 software and final result is reported in Table3:

Table3: The Estimated Model with Pooled EGLS

Dependent Variable: RFDI?				
Method: Pooled EGLS (Period weights)				
Included observations: 9 after adjustments				
Cross-sections included: 9				
Total pool (balanced) observations: 81				
Linear estimation after one-step weighting matrix				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.76E+09	7.71E+08	7.480556	0
RPERGDP?(-1)	456072.5	171408.5	2.660735	0.0103
TRISK?(-1)	-1.39E+09	1.94E+08	-7.16513	0
_AZE--D(OER_AZE)	-2167373	417749	-5.18822	0
_IRN--D(OER_IRN)	9060.757	47346.37	0.191372	0.849
_KAZ--D(OER_KAZ)	-10040551	7867634	-1.27618	0.2075
_KGZ--D(OER_KGZ)	20666240	18418725	1.122023	0.2669
_PAK--D(OER_PAK)	-69335551	53974823	-1.28459	0.2045
_TJK--D(OER_TJK)	1.68E+08	5.04E+08	0.332342	0.7409
_TKM--D(OER_TKM)	-166765.9	89881.2	-1.8554	0.0691
_TUR--D(OER_TUR)	2044.813	239.0988	8.55217	0
_UZB--D(OER_UZB)	-1131936	1109677	-1.02006	0.3123
Fixed Effects (Cross)				
_AZE--C	1.02E+09			
_IRN--C	-40309548			
_KAZ--C	1.50E+09			
_KGZ--C	-6.16E+08			
_PAK--C	-3.49E+08			
_TJK--C	23403165			
_TKM--C	-1.86E+09			
_TUR--C	-2.88E+08			
_UZB--C	6.14E+08			
Fixed Effects (Period)				
1996--C	2.51E+08			
1997--C	1.11E+08			
1998--C	-17683278			
1999--C	-1.53E+08			
2000--C	-2.59E+08			
2001--C	-47931450			
2002--C	91426280			
2003--C	92614361			
2004--C	-67863778			
Weighted Statistics				
R-squared	0.901538	Mean dependent var		7.64E+08
Adjusted R-squared	0.851377	S.D. dependent var		1.11E+09
S.E. of regression	4.29E+08	Sum squared resid		9.74E+18
F-statistic	17.97319	Durbin-Watson stat		1.322897
Unweighted Statistics				
R-squared	0.819305	Mean dependent var		5.84E+08
Sum squared resid	1.13E+19	Durbin-Watson stat		1.401042

Now, the main question is about using fixed effects method. Indeed, We tried to estimate the model with random effects and to do a Hausman test, however we confronted

with a **near singular matrix** in the estimation process, so we could not estimate the model with random effects method.

As table3 shows, the sign of parameter of Real Per Capita GDP(PPERGDP) with one lag is positive and its magnitude is high,I,e it means that if real per capita GDP grows, the real FDI inflows into ECO countries will be high. Also, the impact of total risk(TRISK) with one lag on the real FDI is consistent with theoretical expectations. The major point is that the value of estimated parameter of TRISK(-1) is very low, that means higher risks result in non-desirability of FDI for guest countries or MNEs.

On the other hand, the effect of official exchange rate is uncertain on real FDI. In the ECO economies, various exchange, monetary and fiscal policies are exerted by policy-makers and authorities, thus we expect noncrisp impact of OER on FDI.

Concluding Remarks

The past performance of Economic Cooperation Organization(ECO) is a mirror for the future trends. As we mentioned in the text, foreign direct investment involves some preconditions. Some of these are domestic macroeconomic environment, social and political risks and openness degree of economy. Of course, the consideration of total variables affecting on FDI requires sufficient and up-to date data.

Most of ECO members have not strong database, or their macroeconomic data are secret and not reported. In this paper, we tried to consider the existing data and to shape our analysis. So, this work can be controversial issue and needs to complete by academics.

In summary, it can be said that because of low saving level, smallness of Tax to GDP ratio, the ECO members may be borrow funds from World Bank, International Monetary Fund and foreign banks. However, the common sense indicates the ECO members must act precautionary and appeal FDI, because foreign investors can provide the latest technologies, capital and work skills and the other advantages, while direct borrowing may be results in huge external debts and worsen the domestic socioeconomic conditions.

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The Impacts of Sectoral Demand for Military Expenditure on Peace Dividend: A Case for Turkey and Greece

Durmuş Özdemir
Istanbul Bilgi University

Ali Bayar
Free University of Brussels

This paper examines the effect of sectoral demand for military expenditure on the peace dividend between Greece and Turkey by employing a multi region dynamic CGE model. A general purpose of the study is to examine the prospect for conflict resolution if Turkey become a member state for the EU. This would expected to create a peace between the two countriesin, hence a possible cut back on military expenditure. The model allows to analyse several scenarios; a positive scenario is a certain amount of reduction on Military Expenditure/GDP (ME/GDP) ratios. This may cause a decrease in sectoral demand for military expenditures. This re-allocation scenarios may effect the sectoral distributıon and a higher GDP growth, higher private consumption, lower unemployment, lower interst rates, economic stability and increased FDI for Turkey and improved BoP in both countries in a different level. The economic stability and some spillover effects are some other economic benefits to the EU.

Introduction

One of the driving forces behind the formation of the EU was the established peace in Continental Europe. History tells us that Europe, with a spectacular record of wars, had not been a safe, stable place and two world wars were started there. As stated in the treaty of Rome Europe would work to"… pooling their resources to preserve and strengthen peace and liberty". It is now almost impossible to imagine a war between the member countries. The simple fact is that Europe became a single community with common economic goals, which virtually eliminated the possibility of wars among or between European states. Analogously, the possibility of war between Turkey and Greece will be all but eliminated after Turkish EU membership. Thus, there very likely is a significant peace dividend effect of Turkish membership for all EU members and for the rest of the world.

There is a fair amount of defence-economics literature regarding Turkey and Greece. As Brauer (2001) indicates, these studies can be broadly summarized under five major topics. The first topic is concerned with the issue of an arms race between Greece and Turkey. The second is about the demand-determinants of military expenditure. The third is about the impact of military expenditure on economic growth in Turkey and in Greece. The fourth covers the nature, extent, and impact of indigenous arms production in these countries. The fifth topic deals with the possible peace dividend from reduced military expenditure in Greece and in Turkey. Arms race studies show that (at least for certain periods of time) Turkey and Greece's military expenditures are co-integrated, which indicates that there is an arms race between the two. Hence one country's increased military expenditure affects the other country's military expenditure. A very likely outcome of Turkish EU membership is a sharing of the peace dividend by both countries. Most of the studies on the determinants of the demand for military expenditure show that there is a clear negative link between economic growth and military expenditures. Although Turkey's military expenditure demand is not only driven by its rivalry with Greece, one of the main driving forces is this rivalry. A number of studies have addressed additional factors, such as Islamic fundamentalism, terror, suppression of Kurdish militants and NATO commitments. The impact of these factors tends to be reduced in a more stable, democratic, wealthy country.

A third topic of research focuses on the economic impact of military expenditures. This area of research is concerned with the military sector's total effect on the economy (i.e. on investment, labour, human capital and economic growth), the externality effects of the military sector on the other sectors and the factor productivity differentials among other sectors. This research area differentiates the arms import and the indigenous arms production. The latter appears to effect economic indicators in a more positive way; but the overall effect of military expenditure on economic growth is still negative. Another set of studies concerns the peace dividend from reduced military expenditure in Turkey and in Greece. The disarmament and reallocation scenarios result in lower unemployment, higher economic growth and private consumption and an improved balance of payments[1].

In an analysis of the macroeconomic implications of a reduction in military expenditures by Greece and Turkey, this study examines the potential peace dividend between Greece and Turkey by employing a multi region dynamic CGE model. A general purpose of the study is to examine the prospect for conflict resolution if Turkey becomes a member state of the European Union. This would be expected to create "peace" between the two countries, particularly in the Agean area and in Cyprus; which in turn should lead to a cut back on military expenditure by both sides. The employed model analyzes several scenarios: A positive scenario is a certain amount of reduction on Military Expenditure/GDP (ME/GDP) ratios. This may result in more public consumption, greater public investment savings and tax reductions, relative to a baseline scenario (which involves no change in ME/GDP). The

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membership prospect for Turkey should create cooperation and disarmament between the two countries. These re-allocation scenarios may result in higher GDP growth, higher private consumption, lower unemployment, lower interest rates, economic stability and increased FDI for Turkey and improved balance of payments (BoP) in both countries. Economic stability and various spillover effects are other possible economic benefits to the EU as a result of Turkish EU membership.

Section 2 considers the present state and the last decade of the defence expenditure data in Turkey and Greece. Section 3 develops the model. Section 4 examines the potential peace dividend between Greece and Turkey by employing a multi region dynamic CGE model. The simulation results are presented in this section. Finally, section 5 offers some conclusions.

Defence Expenditures of Turkey and Greece

Due to the lack of transparency in national data on military expenditures for both Turkey and Greece, the reliability and mesurement problems cause more serious problems than any other empirical studies may have in economics. This issue becomes one of the research area in defence economics. There apeared to be the difference between the actual and official figures. Günlük-Şenesen(2002, 2004) has excellent clarifications for the Turkish and Greek ME measurement problems. Although our study will not focus on these issues, it is wort to be aware of this problem.

We begin with observations on the military spending of NATO countries to see how serious this issue of expenditures between Greece and Turkey, using NATO's own data source.

Despite the difference in defence requirements due to the size of army, land, population etc., the level of Greek defence expenditures are nearly high as Turkish defence expenditures. Both countries military expenditure are the highest among the NATO countries. Turkish Military expenditures, however, significantly increases in the 1990's compared to Greece.

Focusing only Greece and Turkey may prowide clearer picture about the problem. In order to avoid the problem of other factors such as size, economic power ect. It might be better to look at in terms of the share of ME in public expenditures of Greece and Turkey. Table 2 provids these ratios for the last decade.

Military spending described as the spending on personnel, maintanence and equipment. Brauer (2002)'s survey concludes that there is no support for an arms race between Greece and Turkey in the 1990's but during the 1980's there is some support for an arms race. Thus a moderate expenditure pattern are expected for 1990's. Obvious problem in these studies is about the data, some data only include the expenditure of the defence ministries but avoid military equipment purchasing from other sources. There is a good clarification in Günlük-Şenesen (2002) for this issue. The data on the military expenditure is the same data as it was used in Günlük-Şenesen (2004). It is taken from the Stockholm International Peace Research Institute (SIPRI) data in 1990 constant USD prices. The total budget expenditures in Greece and in Turkey are in domestic currencies in the OECD data source. Using OECD exchange rate for Drachma, Euro and Turkish Lira in current dollar prices will allow us to be able to have comparative ME/Budget Expenditure ratios. Table 2 below and Figure 2 indicate these expenditure patterns.
(GRBE /ME = Greek Budget Expenditure /Military Expenditure)
(TRBE/ME = Turkish Budget Expenditure / Military Expenditure)

Table 1: Defence expenditures as % of gross domestic product

Country	Avera.1980 - 1984	Av. 1985 - 1989	Av. 1990 - 1994	Av. 1995 - 1999	1999	2000	2001	2002	2003 e
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Based on current prices									
Belgium	3,2	2,8	2,0	1,5	1,4	1,4	1,3	1,3	1,3
Czech Republic	//	//	//	//	2,2	2,2	2,1	2,1	2,2
Denmark	2,4	2,0	1,9	1,7	1,6	1,5	1,6	1,6	1,6
France	4,0	3,8	3,4	2,9	2,7	2,6	2,5	2,5	2,6
Germany	3,3	3,0	2,1	1,6	1,5	1,5	1,5	1,5	1,4
Greece	**5,4**	**5,1**	**4,4**	**4,6**	**4,8**	**4,9**	**4,6**	**4,3**	**4,2**
Hungary	//	//	//	//	1,6	1,7	1,8	1,9	1,9
Italy	2,1	2,3	2,1	1,9	2,0	2,1	2,0	2,1	1,9
Luxembourg	1,0	1,0	0,9	0,8	0,7	0,7	0,8	0,9	0,9
Netherlands	3,0	2,8	2,3	1,8	1,8	1,6	1,6	1,6	1,6
Norway	2,7	2,9	2,8	2,2	2,1	1,8	1,7	2,1	2,0
Poland	//	//	//	//	2,0	1,9	1,9	1,9	2,0
Portugal	2,9	2,6	2,6	2,2	2,1	2,1	2,1	2,1	2,1
Spain	2,3	2,1	1,6	1,4	1,3	1,2	1,2	1,2	1,2
Turkey	**4,0**	**3,3**	**3,8**	**4,4**	**5,4**	**5,0**	**5,0**	**4,9**	**4,8**
United Kingdom	5,2	4,5	3,7	2,7	2,5	2,5	2,5	2,4	2,4
NATO - Europe	*3,5*	*3,2*	*2,6*	*2,2*	*2,1*	*2,1*	*2,0*	*2,0*	*2,0*
Canada	2,0	2,1	1,8	1,3	1,3	1,2	1,2	1,2	1,2
United States	5,6	6,0	4,7	3,3	3,0	3,1	3,1	3,4	3,5
North America	*5,3*	*5,6*	*4,4*	*3,2*	*2,9*	*2,9*	*3,0*	*3,3*	*3,4*
NATO - Total	*4,5*	*4,6*	*3,5*	*2,7*	*2,5*	*2,6*	*2,6*	*2,7*	*2,7*

Figure 1: Military expenditures as % of GDP in NATO.
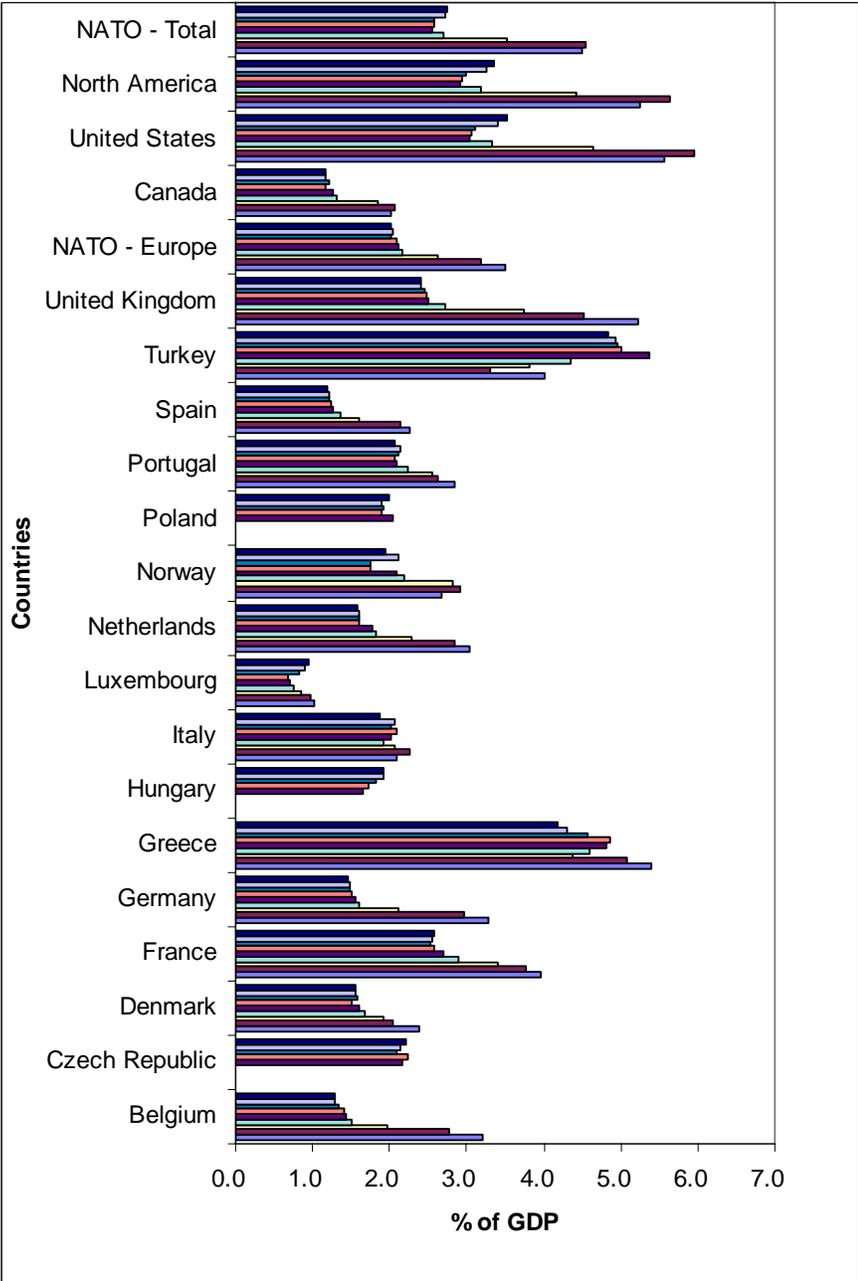
Table2: Share of military expenditure in Budget in Greece (GR) and in Turkey(TR).

Budget and Military Expenditure in Greece and Turkey					%	%
Year	TR-Budget	TR-ME	GR-Budget	GR-ME	GRBE/ME	TRBE/ME
1990	26,266	**5308**	9179	**3863**	42	20
1991	31,167	**6474**	12130	**4215**	35	21
1992	32,213	**7039**	15338	**4585**	30	22
1993	43,926	**10614**	21723	**5381**	25	24
1994	30,092	**7120**	25022	**5788**	23	24
1995	37,313	**9039**	26850	**5650**	21	24
1996	48,292	**12745**	29601	**6205**	21	26
1997	52,42	**13095**	36167	**7487**	21	25
1998	59,56	**15590**	42707	**8809**	21	26
1999	66,539	**20683**	47112	**9591**	20	31
2000	74,539	**22421**	63540	**12046**	19	30
2001	65,436	**18638**	68708	**12837**	19	28

Billion USD in　　　　Current　prices

Figure 2:Military Expenditure in Budget
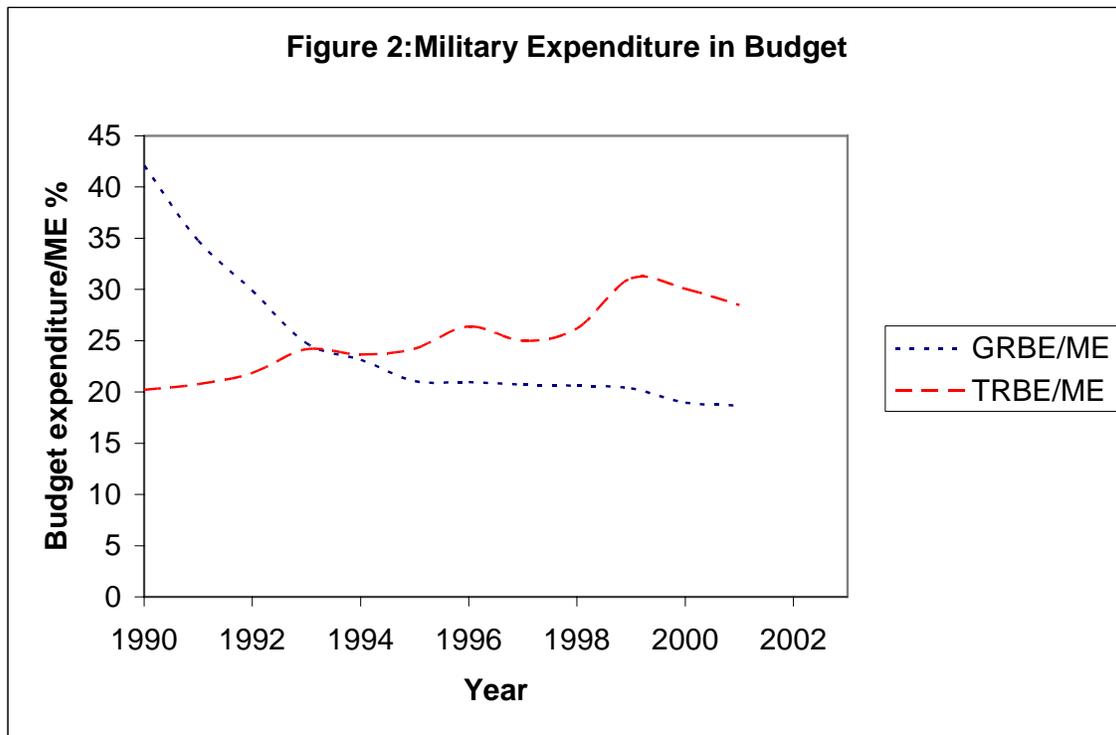
The ME's share in budget expenditures are very high in both countries and ranges from 20% to 40% . For example the amount spent in education is about 3%. It appered to be a very clear argument for the reallocation of public revenues.

We have attempted to clarify the Military expenditure trend but we also need to know tha factors determining the demand for military expenditure in Greece and in Turkey. Greece's militay expenditure follow Turkish military expenditure in general and there are some other factors such as problems in the Balkans and NATO commitments but the biggest factor effecting Greek military expenditure is the Turkish ME. Although the highest factor

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affecting Turkish ME demand was the desire to suppress Kurdish militants in the 1980's, the disagreements with Greece and the other factors such as, fear of islamic fundamentalism, NATO commitments are also quite significant for Turkish demand for Military expenditure (Brauer, 2002 and Günlük-Şenesen(2004).

Thus the expected peace dividend effect for Greece could be higher than Turkey if Turkey becomes EU member and both countries should sustain the current peace initiative.

Sectoral Demand of Military Expenditure

Due to lack of available data on sectoral demand of military expenditures, we have looked into two possibilities. The first data is provided by Turkish Ministry of Defence (TMD). They provided a sectoral data, based on TMD budget allocation as an official data. Since the official data is always under scepticism in any countrys military expenditure data, we also looked into other sources. Unfortunately there arent very many options that we could look into. One possible source is that; all sectoral demand is done according to the adjudication method used in these expenditures. Any sectoral demand first advirtised in official Gazette and than in an auktion they buy the goods or service. We have skimmed thousands of advertisments and realization notices in the official paper. This was a painstakin process which formed our second data source. Tha official sectoral data is provided on the table 3 below.

Table 3: Ministry of Defence Sectoral Expenditures (Official) New TL		
	2003	**2004 (*)**
General Defence Expenditures	3.429.250.000	2.719.675.353
PERSONNEL	3.580.098.294	4.265.558.000
ENERGY	672.957.473	683.499.070
FOOD	646.936.755	693.946.110
TEKSTILE AND LEADHER	316.201.370	308.490.020
HEALTH	217.981.159	243.020.500
MATCHINARY AND EQUIPMENTS	9.175.529	4.707.000
STATIONARY AND OFFICE EQUIPMANTS	37.206.979	36.664.000
WATER AND SANITATION	71.542.571	70.767.700
CHEMICAL SUBSTANCES	206.957.644	135.563.067
CONSTRUCTION, MAINTANENCE OF BUILDINGS AND RENT EXPENDITURES.	354.251.876	224.960.000
COMMUNICATION	28.161.675	28.807.000
SERVICES	227.164.997	213.531.000
VEHICLE	5.445.000	4.642.407
THE OTHER (sleeping bags and some other goods)	405.918.678	378.016.000
Grand Total	**10.209.250.000**	**10.011.847.227**
Note : (*) In 2004, TMD(Turkish Ministry of defence budget cut introduced with the 5103 low(%13 Reduction included)		

The second data source which is presented in table 4 did not appeared to look very reliable. There fore we will be using the official sectoral data distribution for our modelling and simulation purposes. It is clear that not all expenditures are advirtised in the official news paper.

Table 4: Sectoral Expenditures, Ministry of Defence-adjudication results New TL		
Year	2002	**2003**
General Defence Expenditures	10.366.569	
PERSONNEL	0	**158.139**
ENERGY	3.995.370	**20.450**
FOOD	116.527.479	**240.647.028**
TEKSTILE AND LEADHER	267.558.835	**49.235.954**
HEALTH	9.578.283	**2.564.225**
MATCHINARY AND EQUIPMENTS	37.881.223	**3.224.683**
STATIONARY AND OFFICE EQUIPMANTS	3.257.790	**0**
WATER AND SANITATION	1.340.615	**0**
CHEMICAL SUBSTANCES	11.536.510	**809.920**
CONSTRUCTION, MAINTANENCE OF BUILDINGS AND RENT EXPENDITURES.	26.861.770	**39.415.000**
COMMUNICATION	2.553.769	**0**
SERVICES	13.925.339	**83.658.164**
VEHICLE	10.926.465	**0**
THE OTHER (sleeping bags and some other goods)	35.228.530	
sport bags, laboratory exp., natural rubber	0	
Grand Totals	**551.538.547**	**419.733.564**

CGE Modelling Assesment

CGE models are useful for analzing the economic effects of various types of ME and related changes since they can incorporate economy-wide relationships both with in and between countries and provide numerical estimates of the aggregate effects of different policies as well as details on how individual sectors may respond. Although the results can not be compared with actual numbers, the results provide a reasonably good indication of the likely comparative effects on the different policy options.

Our analysis is quantitative and draws from the results of a multi-sector, multi region computable general equilibrium model. Attention is focused on the effect that the peace dividend has on a multitide of variables related to economic performance such as economic growth, employment and welfare. Alternative scenarios related to variations of the Military Expenditure/GDP ratio are examined in order to increase the credence of the analysis.

Changes in GDP growth, production, unemployment, Investment, Capital stock conceived as deviations from the reference case entailing losses or gains for the economic agents, signify the overall costs and benefis to the EU, Turkey, Greece and the ROW.

Firstly, we have constructed a standard static CGE model. The model has endogenous labour productivity and depends on expenditures on education. The total factor productivity depends on investment in infrastructure. There are three preliminary scenarios; Cut military expenditures by 50%, and use the money to:

- Reduce taxes
- Improve education (=>L productivity)
- Improve infrastructure (=> TFP increase)

Table5 provide results of the static effect on GDP growth of a 50% cut in military expenditures which spent on reduced taxes, improve education and improve infrastructure. Improved education increases the labour productivity and improved infrastructure increases the total factor productivity as it was suggested in endogenous growth literature. If the cut spent in education, both countries gain is the highest this followed by Infrastructure and than the tax reduction.

Table 5: Real GDP growth

	Tax	Education	Infrastructure
Turkey	0.15	1.09	0.56
Greece	0.37	5.23	2.01

Figure 3 : Real GDP growth
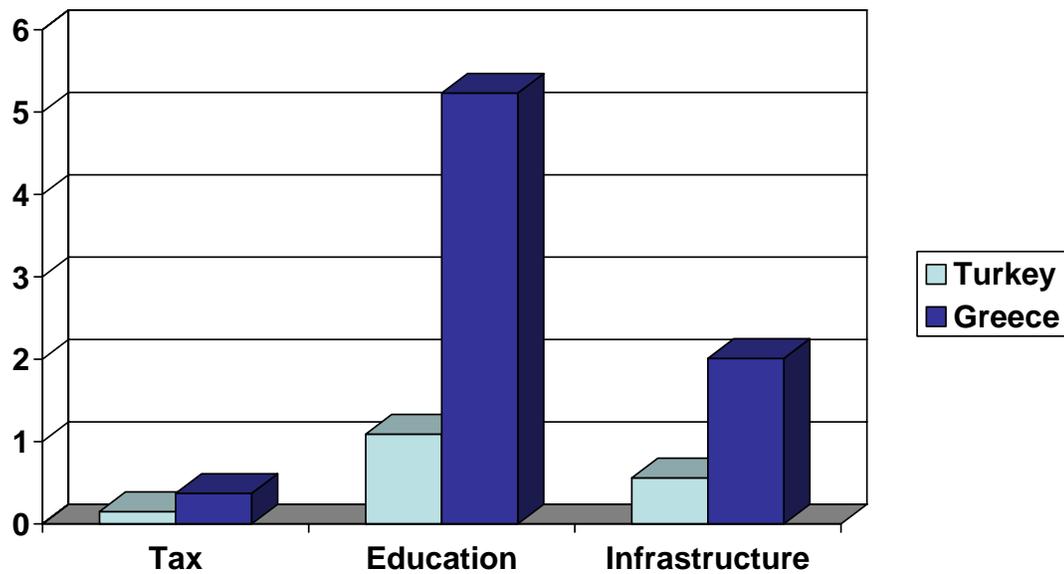
expenditures which spent on reduced taxes, improve education and improve infrastructure. Here the infrastructure and Education expenditures have closer impact for investment in Turkey but the gain for education in Greece is much greater.

Table 6: Investment:

	Tax	Education	Infrastructure
Turkey	2.18	3.04	3.05
Greece	2.57	14.86	8.89

Table 7 gives detailed sectoral production impacts of the three scenarios for Turkey and Greece. Overall impact of a 50% cut in military expenditures which spent on reduced taxes, improve education and improve infrastructure on production in Greece is higher than Turkey and all three scenarios create positive effect. The lowest impact is on clothing and textile in three scenarios in Turkey. The highest impact is on construction for the tax reduction case, on motor vehicle for education expenditure increase and on Transport for Infrastructure expenditure increase case in Turkey. For Greece, the lowest impact is on agriculture for the tax reduction scenarios, on textile for the education and infrastructure expenditure increase. The highest impact is on construction for tax reduction and infrastructure expenditure increase, on electrical machinery for education expenditure increase scenarios.

Table 8 provides detailed sectoral employment effects of the three scenarios for Turkey and Greece. The highest employment impact is on trade for all three scenarios in Turkey.

Table 7: Production

	Tax		Education		Infrastructure	
	Turkey	Greece	Turkey	Greece	Turkey	Greece
Agriculture	1.89	0.41	0.95	1.66	0.52	1.02
Processed Food	1.10	0.60	0.98	2.18	0.73	0.77
Textile	1.05	0.76	0.85	0.58	0.39	0.08
Clothing	0.55	0.79	0.44	1.25	1.16	0.61
Motor Vehicle	3.16	1.61	3.18	7.36	3.72	6.98
Elect Machinery	1.38	1.33	1.62	10.75	0.88	3.74
Metal	2.24	1.35	2.21	5.82	1.43	2.22
Energy	1.85	0.93	2.02	6.14	0.60	2.51
Other Manufact	1.87	1.28	1.96	7.60	1.43	3.08
Construction	2.14	2.12	2.01	13.37	2.68	9.69
Transport	1.23	0.97	2.49	6.71	3.92	4.67
Trade	2.20	1.60	2.13	8.60	2.05	4.90
Finance	2.32	1.38	2.87	6.65	1.71	2.94
Other Services	1.13	1.27	1.69	6.96	0.84	3.42

The negative employment impact is understandably, for the public administration except for increased education expenditures for both Greece and in Turkey. The positive employment impact is on construction for all three scenarios in Greece.

Table 8: Labour

	Tax		Education		Infrastructure	
	Turkey	**Greece**	**Turkey**	**Greece**	**Turkey**	**Greece**
Agriculture	1.17	0.55	-4.81	-10.77	1.9	1.47
Processed Food	2.71	1.64	7.36	2.74	8.11	4.06
Textile	2.69	1.35	8.92	1.63	8.42	2.77
Clothing	2.52	1.43	8.70	2.99	9.39	2.22
Motor Vehicles	3.23	2.11	10.27	6.81	9.12	0.35
Electronic & Machinery	2.76	1.73	9.27	7.97	8.70	5.84
Metal	2.85	1.78	9.64	5.42	9.04	4.53
Energy	2.18	1.66	3.50	0.51	5.53	4.78
Other Manufacturing	2.96	2.19	9.20	6.71	9.12	5.69
Construction	2.45	3.13	10.16	17.94	10.44	13.66
Transportation	3.49	2.00	13.70	11.34	10.85	8.51
Trade	4.45	2.81	17.49	17.48	13.66	9.55
Finance	2.57	2.22	7.16	4.18	7.89	5.64
Other Services	2.95	2.72	9.35	9.58	8.86	7.70
Public Administration	-7.02	-6.44	-1.45	-1.75	-0.91	-1.02

Table 9 indicates detailed sectoral capital stock effects of the three scenarios for Turkey and Greece. The highest capital increase is observed on construction for the three scenarios in Greece. The highest negative impact on capital is observed on public administration for tax reduction case in Greece and in Turkey. The textile and clothing has the other two highest negative impact with the education and infrastructure expenditure increase case in Greece and in Turkey. The highest impact is on construction for the infrastructure expenditure case, on finance for education expenditure increase case and on trade for tax reduction scenarios.

Table 9: Capital

	Tax		Education		Infrastructure	
	Turkey	**Greece**	**Turkey**	**Greece**	**Turkey**	**Greece**
Agriculture	0.61	0.16	0.70	1.62	0.02	0.23
Processed Food	0.04	-0.22	0.04	-1.24	-0.11	-1.25
Textile	-0.31	-0.73	-0.59	-4.99	-0.81	-3.10
Clothing	-0.47	-0.66	-0.79	-3.72	-0.08	-3.62
Motor Vehicles	0.21	0.01	0.65	1.14	0.16	0.39
Electronic & Machinery	-0.24	-0.36	0.27	0.94	0.54	0.21
Metal	-0.15	-0.31	0.07	1.44	0.23	1.45
Energy	0.27	0.32	0.68	2.32	0.47	0.79
Other Manufacturing	0.25	0.29	0.45	0.81	0.21	0.11
Construction	-0.87	0.77	1.52	7.24	4.05	10.46
Transportation	-0.52	-0.79	0.65	1.80	1.66	2.95
Trade	0.40	-0.01	0.77	1.06	0.96	1.28
Finance	-0.43	0.12	2.19	2.60	1.29	0.40
Other Services	-0.06	0.61	-0.20	2.45	0.40	1.54
Public Administration	-9.73	-8.37	0.53	0.49	3.83	5.11

Conclusions

In our CGE simulation experiment, we have examined three preliminary scenarios; Cut military expenditures by 50%, and use the money to, reduce taxes, improve education which increase labour productivity and improve infrastructure where the Total Factor Productivity (TFP) increases. Overall positive impact of this scenario analysis show that both countries growth rate raise. As a policy conclusion, growth maximizing outcome is to cut the ME and spent on education. Sectoral impact is also provides detailed effects.

For future research we need to finalize data and we are also going to use a new version of the updated model to see dynamics, Skilled & unskilled labor effects, Human capital accumulation.

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Challenging the Orthodoxy of Economic Globalisation; a Performative Discourse That Activates the Dynamics of Underdevelopment in West Africa

Abdoulie Sallah
University of Leicester

This paper evaluates critically the discourse of 'economic globalisation'. This discourse extend the belief that capitalist firms now produce the vast majority of goods and services produced in the world (i.e., the commodification thesis) by asserting that this process of commodification is increasingly taking place within an open world economy in which firms operate in a deregulated and seamless global marketplace. In the economic globalisation thesis, therefore, it is a specific type of commodified economy that is becoming hegemonic and stretching its tentacles wider and deeper across the globe, namely unregulated or 'free market' capitalism composed of hyper-mobile and homeless capital operating in a borderless world.

The main aim/objective of this paper is to contest the narrative of economic globalisation adopted by the globalists, demonstrating its performative character. In doing so, it will contest the view that globalisation is the only future, and display how the future is more open than suggested by its proponents. This thesis will use the Gambia to produce empirical evidence of the shallowness of economic globalisation.

So far data that will be use in writing up this paper will be secondary data, but however I am due to be going for a field work in the Gambia in July this year to carryout empirical research, using a barrage of techniques to collect my data. Methods will include a structured questionnaire that will be used to measure the embeddedness of Gambian households in the globalisation process, and also semi-ethnography to evaluate the impacts of economic globalisation.

Although I have not yet reached any results, my research will more than likely prove that:

- Globalisation is a performative discourse.
- The lived practices/coping strategies of households have less to do with globalisation.
- The informal economy in West Africa (The Gambia) is not demising as proposed by the globalists, rather it is increasing.

- Globalisation (Capitalist globalisation) is not the formula for the socio-economic development of West Africa (The Gambia).

- The future is open to other alternatives.

Being the first of its kind in the Gambia, that is to my knowledge, my research other than seeking to challenge the hypotheses of globalisation (akin to commodification and formalisation) also seeks to create some policy implications which would enable the Gambia and other West African states to target social assistance and strengthen their civil society and instruments of sustainable human development in the informal sector.

I strongly believe that unless and until great steps are taking by Gambians and other West Africans to address the current socio-economic equation, we in the Gambia and the West African sub-region will continue to suffer untold socio-economic problems

which will continue to facilitate the development of underdevelopment, and strengthen our own marginalisation that has already been set in motion. I feel that the first and foremost step of the many great steps that would need to be taken, is the studying of the past and present socio-economic conditions of the Gambia and its relationship with capitalist globalisation which will certainly lead to a comprehensive understanding of the current situation.

Introduction

The discourse of globalisation has been regarded as both positive and negative. Viewed from a neo-liberal 'hyperglobalist' perspective, globalisation is a triumph of political liberalism and of the unfettered play of market forces and as likely to strengthen the economic and social basis for the unity of humankind by offering fresh possibilities for 'new partnerships' in the world order (Jinadu, 1999).

From the anti-globalist perspective however, contemporary globalisation depicts the dominant neo-liberal paradigm, a new form of imperialism in which global financial and corporate institutions dominate the global economic and political space. Indeed they argue that it has imposed a violent, post-colonial imperialism; deepened social hierarchies (e.g. class, gender etc.); extinguished vulnerable cultures; facilitated the development of underdevelopment; undermined every fabric of community; massively aggravated ecological degradation; and compromised every claim to knowledge, scientific or otherwise (Axford, 1995; Ake, 1996; Osuji, 1997; Thomas and Wilkin, 1999).

From this viewpoint, for majority of the advanced economies, the process of globalisation has brought about socio-economic success. Globalisation has been a means of tapping more into cheap labour, resources, capital and markets. However, for most 'third World' countries if not all, particularly in sub-Saharan Africa, globalisation has been an awesome and terrifying phenomenon, enlivening the venomous potency of mass poverty and its accompanying multidimensional depravity of the citizenry of all the requisite essence of meaningful living (Akindele et al, 2002). More than anything, globalisation has raised the dynamics of under development (Ake, 1996). Globalisation through its economic liberalism and success for the "developed" World 'has been elevated to the position of absolute truth, a sort of pensee unique or single theory against which there is no credible alternative' (AAPS, 1999) for socio-economic development.

To this effect, this paper will contest the neo-liberalist notions of economic globalisation, exposing its performative and hallow nature and unveiling how it has being a means of socio-economic devastation and destabilisation in sub-Saharan Africa particularly the Gambia. It will also argue against the neo-liberalist notion that socio-economic development in sub-Saharan Africa is only dependent on the strict adherence to the principles and modus operandi of economic globalisation, in most cases designed or influenced by the Bretton Wood Institutions working in the interests of 'advanced' economies.

Economic Globalisation the Highest Stage of Neo-liberal Extremism

Today, the majority of the world particularly those in sub-Saharan Africa are considered to be suffering from a disease of economic malnutrition and socio-economic underdevelopment. The only prescription from Dr. neo-liberalism to such a well-constructed fate is economic globalisation or at least an enlistment into the 'global' economy. But what exactly is economic globalisation. This is a nebulous concept that has been opened to different interpretations, making it difficult to construct a precise definition. However for the purpose of this paper and its objective, economic globalisation will be defined from a neo-liberalist spectrum. Neo-liberals view economic globalisation as the recent and rapid intensification of international trade and investment which is disintegrating and reintegrating distinct national economies into a single homogenous global economy, a development that can neither be resisted nor significantly influenced by human intervention, particularly through traditional political institutions, such as nation-states (Held, 2000). Thus this process of economic globalisation is said to lead to a cross-border integration of factor, intermediate products, and final products markets along with increasing salience of multinational corporations (Prakash,

1999). Neo-liberals also extend the view that this process of economic globalisation is removing all national barriers to the free movement of international capital and resources, which involve trade liberalization, free market mobility, commercialisation and the empowerment of trans-national corporations. For the optimistic globalist (neo-liberals), economic globalisation is something that should be celebrated as it 'benefits consumers by increasing the scale and allocative efficiency of markets for both goods and capital' (Williams, 2005).

To fully comprehend the thesis of economic globalisation, it is imperative to conjure the 'formalisation' and 'commodification' theses because such theses' are akin to each other. The formalisation thesis stipulates that 'goods and services are increasingly provided through the formal economy (the state and market spheres) and the informal economy is in demise' (Williams, 2005). It also views the informal sector as a constraint to socio-economic development, as it breeds socio-economic backwardness and underdevelopment (Williams, 2005). It also perceives the informal sector as 'primitive or traditional, stagnant, marginal, residual, weak, about to be extinguished; a leftover of pre-capitalist formations that the inexorable and inevitable march of formalisation will eradicate' (Williams, 2005). The conceptualisation of the informal sector by the formalisation thesis can be summed up in the words of Seabrook (2003) a populists commentator who pronounce that 'the western poor are dead souls…hustlers and survivors, economic shadows in the shadow economy, the discouraged and despairing who have fallen through the bottom line of accounting systems' (9-10; cited from Williams, 2005).

The commodification thesis on the other hand (also known as the 'commercialisation' or marketization' thesis; see Williams, 2005), extends the view that 'the formal production and delivery of goods and services is increasingly occurring through the market sector rather than by the state or informal spheres' (Williams, 2005). This phenomenon has become a "near universal belief" (Lee, 1999, 200a; Polanyi, 1944; Scott, 2001; Smith, 2000; Watts, 1999; cited from Williams, 2005) due to the proliferation of capitalism and the neo-liberal doctrine. The commodification thesis has attracted many proponents some of whom argue that 'the marketplace is a pervasive force in our lives' (Rifkin, 2003; cited from Williams 2005); that capitalism is altering 'every human interaction into a transient market exchange' (Ciscel and Heath, 2001:cited from Williams, 2005); that 'markets are subsuming greater portions of everyday life' (Gudeman, 2001; cited from Williams 2005); that 'capitalism stands alone as the only feasible way rationally to organise a modern economy' (De Soto, 2001: cited from Williams, 2005); and that 'all plausible alternatives to capitalism have now evaporated' (De Soto, 2001). As pronounced by Amin et al (2002b: cited from Williams, 2005) 'the pervasive reach of exchange-value society makes it ever more difficult to imagine and legitimate non-market forms of organisation and provision'. Thus the commodification thesis extends the view that goods and services are increasingly produced for exchange, that such exchanges are increasingly monetised and that such monetised exchanges are occurring for the purpose of profit. To this effect the commodified realm is perceived as becoming the economic institution rather than one mode of producing and delivering goods and services amongst many (Williams, 2005).

Akin to the formalisation and commodification theses, is the globalisation thesis which espouses the notion that not only are goods and services produced and delivered by multinational corporations (capitalist firms) for the motive of profit making but also that such an operation is taking place in a 'borderless and seamless open world economy in which hyper-mobile and homeless capital restlessly roams the globe unrestrained in search of profit-making opportunities' (Williams, 2005). Within the confinements of this thesis therefore, this supposed to be seamless and borderless world is controlled by and left at the mercy of market forces rather than at the hands of nation states. The widespread propagation of the neo-liberal

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doctrine has made economic globalisation appear as if it were natural, normal and inevitable, like an absolute sovereign. Thus neo-liberals poise that for better or for worst we are all being affected by this inevitable and powerful force of economic globalisation and that our actions, decisions and activities in one corner of the globe would have rapid and significant repercussions on people and places on other parts of the globe (Wiseman, 1998). But to what extent are people's lives embedded into this global economy? Or how much of economic globalisation is taking place? Or is economic globalisation just another hallow and performative discourse? To comprehend this, I would put into consideration the informal sector of the Gambia, which is similar to almost all informal sectors in sub-Saharan Africa.

Defining the Informal Sector in the Gambia

The informal economy has been derogatorily caricatured by some as the 'black market', 'the criminal underworld', 'the world turned-upside down', 'the underground economy' (Smithies, 1984; Feige, 1989), whilst others have more positively labelled it as an 'alternative', 'shadow', 'parallel', 'clandestine', and 'household' economy (Gerxhani, 2004; Charms, 1990; Harding & Jenkins, 1989). Well at least in the Gambia it is coined as the 'domestic economy' (Action Aid the Gambia, 2005) Whereas some hold the notion that the informal sector is a leftover of pre-capitalist social formations, others (Williams & Windebank, 1998) actually argue that despite the existence of capitalist activities (economic restructuring, government policies, market deregulation, and direct foreign investment), the informal sector remains a large, vibrant and growing sphere of economic activity.

Indeed, in the African sub-continent, the informal economy constitutes almost 80% of non-agricultural employment, over 60% of urban employment and over 90% of new jobs in the past decade (ILO, 2002). Whilst this may demonstrate the rate, growth, vastness and scope of the informal sector, it also signifies its importance and status in Africa particularly in countries like the Gambia. But what exactly is meant by the informal sector? The informal sector can be classified into two: the paid and unpaid informal sectors

The informal economy as a concept was first introduced into academic literature by Keith Hart (1970), a social anthropologist, who used the concept to depict a part of the urban labour force, which operated outside the confinements of the formal labour or global market in Ghana and Kenya. This was later used to refer to the strategies employed by individuals to earn their living outside the formal/global economy either as alternatives, complements, and or supplements to it (Bromley & Gerry, 1979). The International Labour Organisation (ILO) first used the concept in the 1970s to refer to the activities of the working poor whose hard work was neither recognised, regulated, protected nor recorded by governments and public authorities (ILO, 2002).

The informal economy also came to have a geographical dimension in that the notion of the informal sector was implicitly linked to the urban economy, a tendency that has continued to persist (Todaro, 1987). However, with continued investigation in academic literature, some researchers came found out that the informal sector was far more pervasive, applying equally to urban and rural areas. For instance, King (1990) highlights that, in the 1980s, there seem to be some point in re-conceptualizing the informal sector as the ordinary economy cutting across rural and urban areas, agriculture and commerce, across survival skills and income- generating strategies (1990, p5).

The informal economy has also been described as a "residual sector", a source of employment for those who are unable to find employment in the formal/global economy. In the context of this definition, the informal sector workers are regarded as low productivity workers. However, empirical research has shown that this is not necessarily the case. For example, Charmes (1990) found evidence which suggested that informal sector workers

generally contributed to GDP over and beyond the minimum wage. Furthermore, he argued that productivity in the informal sector was much higher than average per capita GNP in the economy. When the current situation of the Gambia is put under observation, where over 70% of the total workforce is employed by the informal sector, this argument may seem to be to very true. Another important factor that has not received attention until recently is the non-trivial numbers of households engaging in both informal and formal sector activities (King 1990).

The informal economy has also come to be widely used to describe an expanding and skyrocketing diverse group of workers and enterprises in both rural and urban areas operating informally, who are neither recognised nor protected under the legal regulatory frameworks, henceforth been exposed to a high level of vulnerability. In the ILO's 2002 report, such people are said to include 'own-account workers in survival type activities, such as street vendors, shoe-shiners, garbage collectors, scrap and rag pickers, paid domestic workers employed by households, home-workers, workers in sweatshops (usually disguised as wage workers in production chains), self-employed workers in micro-enterprises (operating on their own or with contributing family workers), and apprentices'. In most cases, people engaged in the informal sector are usually subjected to exploitative institutional arrangements with low incomes, unstable and irregular jobs. In addition, they have no voice for representation and are often placed at a competitive disadvantage as a result of their lack of influence. Some are often put under horrendous conditions and because most of their informal activities often lie on the periphery of the law, public officials who normally interpret such activities as criminal usually subject them to harassment, bribery, extortion and repression (ILO, 2002). Although some of these activities also take place in the formal sector however, the distinction between the formal and informal sector is that those in the formal sector are protected and recognised by public authority, laws and regulations, whilst those in the informal sector remained unrecognised and unprotected.

The ILO also postulates that although the informal sector is not recognised by laws and regulations, this does not necessarily mean that there are no norms or rules orchestrating it. In fact some argue that the informal sector has got, its own "political economy", with its own informal group rules, arrangements, institutions and structures for mutual help and trust, providing loans, organising training, transferring technology and skills, trading and market access, enforcing obligations etc (ILO, International Labour Conference Report, 2002).

Another way to comprehending the informal sector is to take a look at the 'seven essential securities' in relation to those who engage themselves in the informal sector, which they are often denied. These include labour market security, employment security, work security, job security, skill production security, income security, and representation security. The absence of all these securities is what leads to exploitation, repression, unproductive and unremunerative jobs, inadequate social protection and lack of representation, which the ILO labelled as "decent work deficits" (ILO, 2002).

Williams & Windebank (1998) also describe the informal economy as a large and growing sector of paid economic activity, which goes beyond the territory of the formal wage economy. They also postulate that such economic activities are usually 'unregistered' or 'hidden' from the state for tax, social security and labour law purposes, but which are legal in all other respects. In as much as I may want to concur with some aspects of this description of the informal sector in terms of some of the illegal economic activities like child sex exploitation and child labour which are usually hidden away from laws and regulations, I will also want to inject myself with reality not to be totally eclipsed by the Eurocentric aspects of this definition. Although some aspects of this definition will perfectly fit in an African context, as it is very true that some individuals or enterprises in the Gambia deliberately engage themselves in certain criminal-economic activities like drug dealing, child labour etc,

which have laws to deal with them, but which they try to hide from such laws, however, there are also certain informal economic activities which do not necessarily hide away from the laws, thus not been dealt with. This is often due to the deficiency of laws to deal with them in the Gambia. Charmes (1998; p4) pronounces that establishments 'often go unregistered, they do not pay relevant taxes, not only or not mostly out of a desire or willingness to escape and to remain concealed, but more likely because of the inability of governments to enforce often inadequate regulations'

Thus, the element of 'hidden' may not necessarily apply in a Gambian context, where 90% of informal economic activities are used as survival strategies. In Europe or America, laws are created to deal with all forms of economic activities in some shape or form because of their level of economic development and maturity, which may not necessarily be the case in countries like the Gambia, thus resulting in the lack of sufficient laws to cover a wide range of economic activities.

The unpaid informal sector consists of two broad categories of unpaid work. First, there is the 'self-provisioning' type, which according to Williams (2005) refers to the 'unpaid household work undertaken by household members for themselves or for other members of their households'. The second type of unpaid work that constitutes part of the non-wage sector is the 'unpaid community work', which refers to 'work provided on an unpaid basis by and for the extended family, social or neighbourhood networks and more formal voluntary and community groups, and ranges from kinship exchange, through friendship/neighbourly reciprocal exchanges to one-way volunteering for voluntary organisations' (Williams, 2005).

In the case of the Gambia, the unpaid informal sector comes in the form of voluntary groups, youth organisations, cultural associations and religious groups. Indeed, such participants more often than not serve as intermediaries between aid donors, NGOs and the local communities in the Gambia.

The Scope and Nature of the Paid Informal Sector in the Gambia

According to the ILO's labour market report (2000), 72.4% of total employment in the Gambia is in the informal sector. This report also confirms that 66.1% of the participants are males, whilst women constitute over 82.7% of the overall informal sector in the Gambia. The informal sector absorbs a large and growing fraction of the labour force, and provides a "safety net" for the poor, who find themselves excluded from formal employment (global economy) and income opportunities. However, with the slow, or even negative, growth of formal sector employment opportunities in the Gambia, combined with a rapid and significant growth in the urban labour force, economic stabilization and restructuring programmes, and the quest for increased flexibility and deregulation of the economy, it was estimated that in the near future, the informal sector will form over 90% of the total Gambian workforce (ILO, 1997).

The scope of the informal sector in the Gambia includes diverse activities; it represents a heterogeneous universe, irreducible to any subset of specific rules of economic calculation (Castells & Portes, 1989), especially with the continuous proliferation of the informal sector. Based on the recently concluded Economic Census of the Gambia (2005), there is clear indication that the informal sector is evolving along the borders of social struggles, incorporating those too weak to defend themselves, rejecting those who are too conflictive, and propelling those with stamina and resources into surrogate entrepreneurship (Castells & Portes, 1989). Because of the heterogeneity of definitions of what the informal economy is, it becomes very problematic to identify a structure for it. However because the informal sector is being dealt with from the Gambian context, I will in no way hesitate to use the Gambia government's description of the informal sector, which more than anything

focuses on the number of employees and registration. Although the definition of the informal establishments varies from industry to industry, however in a more generalist view all establishments employing less than five employees are considered informal (Gambia Economic Census, 2005).

The 2005 economic census concludes that two hundred and ten thousand (210,000) people are employed by eighty two thousand one hundred and seventy (82,170) establishments in both formal and the informal sector. Out of the 82,170 establishments, 75,977 (92%) employ less than five people whilst the remaining 6,193 (8%) employ more than five people. Out of the 75,977 establishments that employ less than five people 10,066 (7%) are registered whilst 65,911 (93%) remain unregistered. In the case of the establishments employing five or more people, 2692 remain registered whilst 3501 are unregistered. Henceforth if the number of employees is the only criterion for defining the informal sector, then it is the case that about 92% of all establishments operate under the informal economy and if registration is the only criterion then it means that the informal sector consumes up to 79% of all establishments in the Gambia, whilst the formal sector only takes 21%.

Based on the revelations of the economic census, the informal sector is more concentrated in the urban areas of the Gambia. The Gambia is administratively divided into eight regions, three of which (Banjul, Kanifing, Brikama) are considered to be the urban regions whilst the remaining five (Mansakonko, Kerewan, Kuntaur, Janjangbureh, Basse) are considered to be the rural or provincial areas. Out of the 75,977 of all establishments in the informal sector, 59,175 (85%) are concentrated in the urban regions (Banjul, Kanifing, Brikama) whilst the remaining 16,802 (15%) are found in the rural or provincial regions (Mansakonko, Kerewan, Kuntaur, Janjangbureh, Basse).

Industry wise the trade sector (wholesale & retail) happens to be the dominant area where most informal economic activities take place as it accounts for 56,000(75%) of all the informal establishments in the Gambia, followed by the manufacturing sector which accounts for 9,000 (12%). The utilities, mining and quarrying sector accounts for 63 establishments (0.084%) whilst the finance and insurance sector happens to be the area where the least informal economic activities take place (51 establishments (0.068%). According to the population census of the Gambia (2003), the Gambia has about 1.3 million people, 476, 439 (35%) of which are employed in the formal and informal sectors and 884,242 (65%) unemployed (not engaged in any form of formal or informal economic activities). Meanwhile, more men (64%) are engaged in the informal sector in the Gambia than women (36%). Within the paid informal sector in the Gambia, men dominate the fishing sector (58%), the manufacturing sector (81%), the construction sector (94%), the transport sector (90%), the communications sector (76%), the finance and insurance sector (77%), the education sector (73%), the health and social work sector (75%), and the community and social services sector (59%), whilst women account for 90% of the agricultural sector, 56% of the wholesale and retail industry, and 53% of the hotel and restaurant sector.

Based on the above statistical data extrapolated from the 2005 economic census of the Gambia, the informal sector seemed to have grown by 20% from the year 2000 (that is from 72% (ILO, 2000) to 92% in 2005). Although this information does not give a real representation of the informal sector in the Gambia as it fails to consider the unpaid sector to be a component of the informal sector, and individuals who neither are a part of the informal establishments but who just do their own personal businesses (like shoe-shiners, and housemaids), however it does give us a picture of what the informal sector is like in the Gambia.

The Scope and Nature of the Unpaid Informal Sector in the Gambia

Although the paid informal sector has received more attention than the unpaid informal sector in academic literature and research, which has overshadowed the significant, existence, and socio-economic velocity of the unpaid informal sector, the Gambia happens to be an exceptional case where more people are involved in the unpaid informal sector than both the paid informal and formal sectors put together. According to the 2003 population census, the Gambia recorded 1.3 million people out of which only an estimated 410, 000 (35%) are employed in both the formal and paid informal sectors. This leaves more than 890,000 (65%) of the population unemployed (not even in the paid informal sector), resulting in a high level of dependency and   poverty (69% of the population live below the poverty level). One intriguing question that would need to be answered is whether the 65% of the population excluded from both the formal and paid informal sectors really makes them participants in the non-wage informal sector. In answering this question, I will focus on the definitions forwarded by Williams (2005), thereby dividing the structure into youth (community) organisations, voluntary organisations, cultural/religious groups and self-provisioning.

Youth Organisations

In his concluding remarks on the state opening of the 2003 National Assembly, the president of the Gambia (Dr.Yahya Jammeh) stated as follows;

The Youth constitute a significant proportion of the country's population …I therefore call on the youths, in particular, to engage themselves in the informal sector and in trades-manship, as it is apparent that Government cannot achieve its goals alone without the necessary support and participation of all Gambian… This Government is calling on the youths and encouraging them to engage in self-employment in agriculture and other sectors of the economy in order to address the issue of unemployment in this country. (State Opening of the National Assembly Sessional Paper 1, 2003)

Indeed the Gambia is well nourished with a vibrant youth (15-29 years) sector, which constitutes well over 60% of its population. It is the case in the Gambia that the majority of the youth population is engaged in the non-waged informal sector through community youth organisations. It is even the case that most youths who are the in paid informal and formal sectors also participate in the non-waged informal sector.

The Gambia happens to be well furnished with a variety of youth groups/organisations who actively engage themselves in different development-oriented activities within the parameters of socio-economic well-being. Such activities usually include community development projects like building and rehabilitation of community schools, health centres, skills centres, local bakeries and environmental sanitation. For instance in 1997 in the village of Old Jeshwang (seven (7) km away from Banjul the capital city of the Gambia), where a primary school (Old Jeshwang Primary School), which caters for the educational needs of more than one thousands pupils was falling apart a youth association (known as the Youth Association for Advancement) together with two other youth groups, rehabilitated the school into a brand new one. All the rehabilitation work was undertaken by the local members of the associations without any form of payment. The Youth Association for Advancement has also carried out numerous cleansings exercises (known as 'set-settal') in the Old Jeshwang Village. This process charges the local members of the youth association with the responsibility of clearing and dumping community wastes, cleaning rubbishes from community streets, creating drainages systems during the rainy seasons and also recycling recyclable products. Not only do youth associations like YAA rebuild and rehabilitate

schools, health centres and skills centres, but they also provide the human resources (i.e. teachers, teaching assistants, nurses, and other experts) to facilitate the smooth running of such centres. This is where youths who participate in the paid informal and formal sectors come in as volunteers rather than paid people. In the urban and rural regions of the Gambia, there are over a hundred youth organisations that engage in such community initiatives without any forms of payments.

Meanwhile, other youth organisations in the Gambia like the Kanifing East Youth Development Society (KEYDS), the Bakau Youth Association for Children's Welfare (BYCAW), Lend a Hand Society (LHS) and the Organisation for Future Development (OFD) render community services such as vocational skills training to disadvantaged young men and women in local communities, sponsor local students in schools, produce local products like jam, mayonnaise, poultry and diary products, and agricultural products to their local communities. Some even construct boreholes in their local communities to cater for the need of safe and hygienic drinking water. All such community services are rendered by youth organisations in the Gambia through their local members free of charge (no form of payment involved).

Voluntary Groups

Voluntary groups play a very pivotal role in the socio-economic development of the Gambia. Whilst some of the voluntary groups are international (like the Red Cross, Girls Guide, Rotary International), others are local voluntary groups some of which, are based outside the Gambia (like the Gambia United Society based in the UK, the Gambia Education Support Organisation in Denmark) and the rest based inside the Gambia (like Kingfisher Trust, Bafrow etc). The unpaid services they render to the local communities in the Gambia ranges from education, health, agriculture, trade, vocation, through to environment, manufacturing, finance and transport. For instance Kingfisher Trust the Gambia, which is a non-political and sectarian community-oriented group, has carried out a significant number of community projects in different local communities in the Gambia since its inception in 1990. For example within the local community of Yuna, it has created more than sixty-five vegetable gardens for the locals, built a number of local shops, created an area for sheep fattening and poultry, build a complete carpentry and metal workshop, a garden store, a swing, and also provided a significant number of bicycles and sewing machines. In addition, it also provides the human resource and expertise in training the locals to sow and knit, carpentry and metalworking, typing and computing, and also in food maximisation techniques and methods. The group has also been actively involved in building nursery and primary schools in local communities whilst at the same time giving sponsorship to deserving children. There are over three hundred (300) community voluntary groups currently operating in the Gambia, carrying out similar works like those of Kingfisher Trust the Gambia. These initiatives are usually undertaken by local members of such community groups without any forms of payment.

Self-Provisioning in the Gambia

The Gambia as a society of diverse people is culturally oriented and believes in holding family ties more than anything. Unlike Europe and America where family separation in most cases starts when somebody reaches the age of eighteen (18), in the Gambia, families always stick together, living in the same compound for four to five generations (sometimes until death reap them apart). The extended family system forms the core of the Gambian society where different members of the extended family system are expected to play different

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roles. As a very patrimonial society, the male (husband, brother, uncle, grandfather) is generally marked with the responsibility of providing sustenance for all the family members, ensuring the protection of family members and property and also undertaking all repair and maintenance work that proves to be physical. The female (mother, wife, sister, aunt, grandmother) is expected to care for the children, cook meals, clean the compound, wash the family clothes and also when possible do subsistence farming. The grandparents in most cases sit at home to look after the children, tell them stories and history, and teach them manners, values, culture and religion. A high level of sharing and caring takes place among family members. An average extended family living in the same compound in the Gambia may consist of up to twenty-five people. Any work that is to be done has got a head (a decision maker) and where the work proves to be complex and difficult; a family meeting is usually convened to do analysis of the work to see how the family members could do it. Such works usually undertaken by family members may range from building houses, cultivating a family farm, to constructing a drainage and sewage system and digging wells for fresh water. Where children become old and mature enough, females are taken to the farm to learn and help their mothers, whilst males go with their fathers to their workshops to help and learn from them. Although this may not necessarily be the case in the urban regions of the Gambia, however one has to bear in mind that almost 60% to 70% of the Gambian population leave in the rural areas. Even in the urban regions of the Gambia, a high level of self-provisioning takes place due the government's inability to provide the basic social amenities for the people. For instance in the greater Banjul area, waste collection from family homes is supposed to take place once every week, but due to the government's inability to cater for such needs, families would often come to combine forces to get rid of such wastes which usually create breeding grounds for mosquitoes. In addition, because of poor roads, streets in most local communities can just be likened to mini lakes when it rains. To this, again families often come together to create temporal drainage systems to ooze rainwater from their homes and local communities.

Contrasting the Gambian Informal Sector and the Globalisation (Akin To Commodification and Formalisation) Thesis

The current nature, scope and composure of the informal sector in the Gambia greatly challenges the claims of both the 'formalisation' and 'commodification' theses (see Williams, 2005). The formalisation thesis stipulates that 'goods and services are increasingly provided through the formal economy (the state and market spheres) and the informal economy is in demise' (Williams, 2005). It also views the informal sector as a constraint to socio-economic development, which brings about socio-economic backwardness and underdevelopment (Williams, 2005). Based on the current nature of the paid informal sector in the Gambia, informal economic activities cannot be viewed as a euphemism for poverty because poverty is linked to the process of distribution whilst the informal sector is related to production, but rather it can be viewed as a mechanism that the Gambia government is tolerating and even stimulating in order to resolve 'potential social conflicts and to promote political patronage' (Castells & Portes, 1989). Thus in the Gambia, the paid informal economy has become a means of coping with 'population growth, rural-urban migrations, economic crises, poverty and indebtedness' (Charmes, 1998).

In addition, although the informal sector in the Gambia reinforces the geographical dimension (that is the notion that the informal sector is implicitly linked to the urban economy (Todaro, 1987)) as 85% of all informal establishments are concentrated in the urban regions of the Gambia, however, it also indicates that the informal sector is also active in the rural regions of the Gambia (15% of all informal establishments). One particular reason for the urbanisation or the concentration of the informal sector in the urban regions of the Gambia is

the high level of rural-urban migration that started from the development decades (1965-1985), which witnessed the centralisation of all development activities in the urban regions.

The current unpaid informal sector in the Gambia also debunks the hypothesis of the 'commodification thesis' (also known as the 'commercialisation' or marketization' thesis; see Williams, 2005), which postulates that 'the formal production and delivery of goods and services is increasingly occurring through the market sector rather than by the state or informal spheres' (Williams, 2005). As observed by Williams (2005)

> …a worrying and disturbing finding once one starts to investigate the musings of the above adherents to commodification, is that hardly any evidence is ever brought to the fore either to show that a process of commodification is taking place or even to display the extent, pace or unevenness of its penetration

The argument I want to raise here is that probably all the lamentations being done on behalf of the commodification, formalisation and globalisation theses are (a) very subjective in nature (in the sense that all such comments made are influenced by the socio-cultural and politico-economical orientations and environments of the commentators), and (b) that they are very Eurocentric because they failed to look beyond the West in order to give in-depth considerations to African countries like the Gambia as reflected in the active existence and contributions made by the unpaid informal sector in the Gambia. I also argue that such commentators lack complete socio-cultural competence of non- western countries like the Gambia, and that they only present what is given to them by the custodians of western development (the capitalists) rather than conducting their own empirical research to establish reality. Although commodification may be the principal embodiment of the structural adjustment programmes and economic recovery programmes that are currently been experimented on and implemented by most African countries like the Gambia, however the present equation of the unpaid informal sector in the Gambia suggests that the commodification thesis at best can be described as a 'vague theory and thin empirics' (Martin and Sunley, 2001; cited from Williams, 2005), and at worst as the delusion of the illusionist.

Economic Globalisation a Source of Socio-Economic Underdevelopment and Destabilisation: The Case of the Gambia

Since independence in 1965, the Gambia has tailored its socio-economic policies, both externally and internally devised, to conform to the apparently inevitable and immutable future of globalisation. Its endeavour to formalise its economy and eventually become more integrated into the globalisation process (global economy) has been centred around the neo-liberal premise that a formalised/globalised economy will contribute positively to national socio-economic development, particularly through job creation, income generation, poverty reduction, expansion of economic opportunities as well as increased participation of people in national planning and decision making (Private Sector & Food Production Report, 2002).

However, economic globalisation has compelled countries like the Gambia to open up to international trade, remove barriers to foreign investment, and reduce corporate regulations and taxes, as well as other disincentives to vibrant economic activities. The deliberate policy factors driving economic globalisation include the advocacy for and implementation of the new free-market economic order following the collapse of the Bretton Woods system of fixed exchange rates in 1971 (UNDP, HDR 1999).

In the Gambia and most 'third' world countries (Ghana, Nigeria, Sierra Leon, Costa Rica, Mali, Senegal, Burkina Faso) tools used for implementing this approach among other things included liberalization and privatization reforms that were embedded in the Structural Adjustment Programmes (SAPs) introduced around 1985. This period witnessed the removal of agricultural subsidies and the privatization of the Gambia Producing Marketing Board

(GPMB) as the Gambia moved towards liberal and free market policies. The Economic Recovery Programme (ERP) initiated and supported by the World Bank in supplementing Gambia's efforts towards a free market economy and free capital mobility, led to the eradication of import and export licensing requirements, the liberalisation of foreign transactions, customs tariff reduction and mass unemployment. Paradoxically, like in many other 'third' World countries, economic globalisation increased the Gambia's demand for social insurance whilst decreased its capacity to provide it.

Around 1985, the Gambia's inability to meet its debt service obligation, coupled with its inability to secure commercial credits resulted in domestic shortages of vital and basic commodities such as rice, sugar, electricity, water and petroleum (Sallah, 1990). In countering such a socio-economic situation, the economic recovery programme financed by the IMF and World Bank was introduced with the aims of curtailing inflation, boosting annual real GDP growth by 3.3%, creating a viable volume of official foreign exchange reserves, reducing external arrears, and normalising relations with creditors (Sallah, 1990). However, the most outstanding aim of the ERP was to revitalise the economy and make it self-sustainable through world market adaptation (Fyhri, 1998). This programme saw the formalisation of all sectors in the Gambia as the government embarked on a comprehensive mission of liberalising the pricing and marketing structures in the Gambia to encourage private sector participation on socio-economic activities, whilst at the same time enforcing stringent discipline on demand management through appropriate monetary, fiscal, exchange-rate, and external debt policies (Sallah, 1990). The government also adopted a tight policy over public enterprises, and government apparatus through financial and administrative reforms such as reducing the size and scope of the civil services, and also strengthening the financial and tax system. As Sallah (1990) stipulates, a major element of the overall ERP reform package was to introduce a floating system so as to divert business from the "black market" or "parallel market", which was thought to be diverting much business and badly needed scarce foreign exchange from the formal banking system and other sectors (World Bank, 1989).

Indeed the IMF in its Enhanced Structural Adjustment Facility Policy Framework Paper (1998-2000) pronounce that under the Economic Recovery Program, strong economic policies and a broad range of socio-economic reforms were put in place, which included a tight fiscal policy involving improved expenditure control and an enlarged tax base, a restrictive monetary policy, strengthened economic incentives, including the lifting of most price controls and the introduction of a market-determined exchange rate in the context of a liberalized trade and payments system and the divestiture of a number of public enterprises and the strengthening of the financial position and operations of enterprises remaining in the public domain. The implementation of such formalisation policies was supported by the international community, in particular by the International Monetary Fund with a three-year arrangement under the Enhanced Structural Adjustment Facility (ESAF) that expired in November 1991, and by the World Bank through structural and sectoral lending, including the second structural adjustment loan (SAL II), which got completed in June 1992. Sehn (1992a) further pronounce that economic recovery, which formed the core of structural adjustment in sub-Saharan Africa included measures such as exchange rate devaluation, fiscal policy restructuring, monetary discipline and interest rate rationalization, as well as an array of institutional reforms that involved redefining the role of the state and public enterprises engaged in a range of activities including control of agricultural input and product marketing.

For some (IMF, World Bank, the Gambia government), the externally devised economic recovery programme brought about tremendous economic growth and development to the Gambian people. Sallah (1990) postulates that the introduction of the economic recovery programme significantly improved the Gambia's economy, whilst the World Bank report (1989) stated that 'since the adoption of the ERP, the rate of inflation has dropped from

70 percent in 1985/86 to about 9 percent in 1987/88…and an average annual increase in real GDP of 5.5 percent during 1986-8'. The IMF in its Policy Framework Paper 1998-2000 mentioned that the Gambia until mid 1993 made significant progress in reducing financial imbalances, liberalising its economy, and strengthening its basis for durable economic growth through the economic recovery programme.

However, the question that is often ignored is whether such economic growth and stabilisation really got translated into socio-economic development or whether the local Gambians equally shared such views of economic advancement. Well according to the People's Democratic Organisation for Independence and Socialism (PDOIS), the real purpose of the ERP was not to facilitate the development of the productive sectors of the economy but to programme it in such a way that the Gambia would be able to repay its loans and interests on them, by hook or by crook…the government was now to be the local tax collector of the international money lenders (Foroyaa Newspaper, 1989; cited from Sallah, 1990: 629)

Others have also accused this formalisation programme for greatly contributing to increased poverty and food insecurity in sub-Saharan Africa particularly the Gambia (Cornia, Jolly and Stewart, 1987), where to-date 69% of the population live below the average poverty line. Wadda (2000) stipulates that although macroeconomic indicators gained the recognition and approval of the Bretton Wood institutions, however more people fell into poverty, illiteracy and poor health. In the case of The Gambia for instance, the introduction of the economic recovery programme in 1985 saw the retrenchment of up to 3,324 employees out of the 14,224 government employees by December 1985, whilst seven hundred positions were suppressed (Touray, 2002). Such redundant workers were labelled as "excess baggage" by the government. This act of retrenchment carried out in the name of efficiency led to the proliferation of unemployed people in the Gambia and increased their deprivation.

The introduction of the economic recovery programme in the Gambia also initiated the elimination of subsidies on essential goods and services such as farm tools, fertilizers, medicine, and education (Touray, 2002). This worsened the deprivation of the poor and the unemployed. As   Pleskovic and Bruno (1995) observe, 'one of the great tragedies of the 1980s in Africa and Latin America was not only their poor economic performance but also the simultaneous reduction in government expenditure'. The reduction in government expenditure resulted in the deterioration of public infrastructure, decrease in the quality of service delivery, and increase in the cost of basic essential services such as health care and education (Touray, 2002). For instance according to the National Report on Sustainable Development (2002), total expenditure in the social sectors of health and education was reduced from 32% in 1984/85 to 14% in 1987/88 in the Gambia. These coupled with increased taxation and the introduction of a tax-based economy further increased the gap between the poor and rich and also the untold suffering of the poor and rampant corruption. In The Gambia for instance, health service charges rose to 500% from D1.00 to D5.00 in the mid 1980s whilst education school fees increased and the cost of school furniture was bored by the parents without corresponding increase in the quality of services (Touray, 2002).

Conclusion

Neo-liberalism [economic globalisation] is not the natural human condition, it is not supernatural, it can be challenged and replaced because its own failures will require this. We have to be ready with replacement policies which restore power to communities and democratic states while working to institute democracy, the rule of law and fair distribution at the international level. Business and the market have their place, but this place cannot occupy the entire sphere of human existence (George, 1999: p8).

In this paper, I have critically looked at the economic globalisation thesis to contest its stereotypes on socio-economic development particularly in the Gambia. The thesis akin to the commodification and formalisation theses is presented as a process that will create jobs and resources for all whilst at the same time ensuring an adequate distribution for general survival and stability (Ambrose, 2004).

I have also tried to expose the performative and hallow nature of the economic globalisation thesis by putting the Gambia and its informal sector into perspective. Evidence produced in this paper demonstrates that the informal sector is not in demise but instead it is on the increase. Economic globalisation is presented as a natural and inevitable phenomenon that cannot be resisted or influence and of course which accommodates no potential alternatives. But as Massey (2005: 5: cited from Williams, 2005) pronounces

> Globalisation in its current form is not the result of a law of nature (itself a phenomenon under dispute). It is a project…statements…such as there is no alternative…is not a description of the world [but]… an image in which the world is being made.

The process of economic globalisation has also being a source of socio-economic destabilisation and underdevelopment in sub-Saharan Africa particularly the Gambia. Indeed it has been an awesome and terrifying phenomenon, enlivening the venomous potency of mass poverty and its accompanying multidimensional depravity of the citizenry of all the requisite essence of meaningful living (Akindele et al, 2002).

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TECHNOLOGY

Technology

Knowledge Sharing in a Community of Practice

James Hopple
Troy University

Emrah Orhun
Troy University

The aim of this study is to develop an understanding of the factors influencing participants' knowledge-sharing in an electronic network of practice. The study builds on a theoretical framework derived from the theory of reasoned action and theories of social capital and social exchange. A model of knowledge sharing in an electronic network of practice has been developed based on this framework, which attempts to integrate factors validated through recent empirical studies (Kankanhalli et al., 2005; Wasko and Faraj, 2005; Bock et al., 2005). The model that considers the factors influencing the knowledge contributor and the knowledge seeker has been empirically tested using a survey in the Financial Management Community of Practice (COP) in the USAF Portal.

Figure 1 shows the research model adopted for the study, which incorporates constructs from social exchange theory and social capital theory. Data were collected from members of the Financial Management (FM) Communities of Practice (COP) on the AF portal. Partial least squares (PLS) was chosen as the structural equation analysis method to the test the hypotheses.

The study demonstrated that experience in the profession influenced the amount of contribution, but that self-rated expertise did not. The findings indicate that relational capital may not be as important to usage, but it is strongly related to the intention to share knowledge. The study also indicated that commitment to the community of practice was not a factor in knowledge contribution. Concerning anticipated extrinsic benefits, the results show that individuals are not motivated by these types of rewards whether monetary in nature or reputation-based. The hypothesis regarding the sense of self-worth through the intention to share knowledge was not supported. Secondly, the results showed that the anticipated loss of knowledge power that occurs when an individual shares personal knowledge, did not influence an individual's intention to share knowledge in the COP. Finally, an individual's codification effort indicated only a relationship with number of messages posted.

The results provide some evidence that cognitive social capital influences intention to share knowledge.

Introduction

Knowledge is considered a valuable asset for contemporary organizations and the capability for knowledge management has emerged as a critical factor in sustaining competitive advantage (Grant, 1996; Sambamurthy and Subramani, 2005). Brown and Duguid's (2001) research has shown that "the key to competitive advantage is a firm's ability to coordinate autonomous communities of practice internally and leverage the knowledge that flows into these communities from network connections." The flow of knowledge "across individual and organizational boundaries" and into organizational practices is ultimately dependent on individuals' knowledge-sharing behaviors (Bock et. al, 2005). The aim of this study is to contribute to our understanding of the factors that influence individuals' intentions to share knowledge in an electronic network of practice. A model of knowledge sharing in an electronic network of practice has been developed based on recent theoretical and empirical studies. The model that considers the factors influencing the knowledge contributor and the knowledge user has been empirically tested in the Financial Management Community of Practice in the US Air Force Portal.

Information and communication technologies' crucial role in supporting the creation and management of knowledge is well established. The repository model and the network model (Alavi and Leider, 1999) are the two main models of IT-based knowledge management systems. In the repository model an electronic knowledge repository stores codified or explicitly documented knowledge. The network model focuses on the communication and exchange of knowledge among people. A recent trend in the technology for knowledge management is portals—web sites that aggregate various computer-mediated communication tools such as e-mail, forums and chat rooms, coordination tools such as calendars and task lists, and links to data and documents users need. Portals are thus gateways to a knowledge domain that can support both the repository model and the network model of IT-based knowledge management systems. Fernandes *et al.* (2005) suggest that "portal technology provides the best infrastructure to store, access and transfer knowledge."

Typically computer-mediated communication is used by individuals engaged in common practices to form social networks in order to facilitate knowledge exchanges. Brown and Duguid (2001) have identified two forms of such social networks in shared practices based on the notion of communities of practice (Lave, 1991; Lave and Wenger, 1991): communities of practice and networks of practice. Networks of practice are formed by people who share a common practice but do not know each other. In such networks there is typically no collective action and little knowledge is produced (Van Baalen et al., 2005). Wasko and Faraj (2005) use the term "electronic network of practice" to refer to networks of practice where knowledge exchange is achieved primarily through computer-mediated communication. Van Baalen *et al.* (2005) have found that a knowledge portal has an impact on knowledge sharing and on the emergence of a network of practice.

However, as Wasko and Faraj (2005) observe, "the availability of electronic communication technologies is no guarantee that knowledge sharing will actually take place." Sambamurthy and Subramani (2005) point out that IT-mediated knowledge sharing is an intensely social phenomenon, which has not been adequately researched.

This paper continues with an overview of the theoretical framework derived from the theories of social capital and social exchange. It then describes the research model and develops the research hypotheses concerning the relationships assumed in the model. The results of the empirical study conducted to test the model through a survey are presented next. Finally, the conclusions are summarized.

Theoretical Framework

Bock et al. (2005) suggest that individuals' knowledge sharing behaviors are influenced by motivational forces and organizational culture or climate. Findings of research in electronic networks show that enhancing reputation or image, enjoyment in helping others, organizational rewards, reciprocity and knowledge self-efficacy can motivate individuals to share their knowledge (Kankanhalli et al., 2005; Wasko and Faraj, 2000). Prior research also suggests that cost factors such as loss of power and codification effort can act as inhibitors of knowledge contribution (Kankanhalli et al., 2005).

Knowledge sharing can be seen as a form of social exchange where "knowledge contributors share their knowledge with no exact expectation of future return" (Kankanhalli et al., 2005). Prior research has used social exchange theory (Blau, 1964) to identify cost and benefit factors affecting individuals' knowledge contribution. The relationships between some of the cost and benefit factors and sharing behavior are moderated by contextual factors (Kankanhalli et al., 2005). The sum of the aspects of the social structure that moderate and facilitate the actions of individuals within the structure are referred to as social capital (Nahapiet and Ghoshal, 1998). Following Bourdieu (1986), Nahapiet and Ghoshal conceive social capital as the network of relationships embedded within a social structure and "the assets that may be mobilized through that network." They make a distinction between structural, relational and cognitive dimensions of social capital. The structural dimension refers to "the overall pattern of connections between people." The relational dimension "focuses on the particular relationships people have, such as respect and friendship, that influence their behavior." The cognitive dimension "refers to those resources providing shared representations, interpretations, and systems of meaning among parties." Nahapiet and Ghoshal's model is useful in explaining the creation of intellectual capital within organizations. Wasko and Faraj (2005) have adapted Nahapiet and Ghoshal's model to the individual level to examine how aspects of an individual's social capital influence one's knowledge contribution to a network.

The research model hypothesized in this study attempted to integrate the three models described above to examine how individuals' intention to share knowledge in a network of practice are influenced by the factors derived from social exchange theory and social capital theory.

Bock et al. (2005) have augmented the theory of reasoned action with extrinsic motivators, social-psychological forces and organizational climate factors in their attempt to develop an integrative understanding of the factors influencing individuals' knowledge-sharing intentions. According to the theory of reasoned action (Fishbein and Ajzen, 1975) an individual's engagement in a specific behavior is determined by their intention to perform the behavior, which in turn is determined jointly by their attitude and subjective norm (Bock et al., 2005). The model developed by Bock et al. (2005) posits that an individual's subjective norm influences intention to share knowledge directly and indirectly (through attitude), and organizational climate influences intention to share knowledge directly and indirectly (through subjective norm). They have identified fairness, innovativeness, and affiliation as salient aspects of organizational climate that are conducive to knowledge sharing. They have considered anticipated extrinsic rewards, anticipated reciprocal relationships and sense of self-worth as motivational factors. Their model has more explanatory power with the inclusion of the organizational climate factors that affect attitude toward knowledge sharing through subjective norms and intention to share directly. However, cost factors are not included their in model.

Research Model and Hypotheses

The dependent variable in focus in this study is the degree of intention to share knowledge in an electronic network of practice supported by a portal. In the present paper, we will focus on part of the integrated model that covers only the constructs related to intention to share knowledge. Figure 1 shows the research model, which incorporates the constructs of reputation, enjoyment in helping others, self-rated expertise, tenure in the field, commitment and reciprocity, which have been adopted from Wasko and Faraj (2005). The construct of centrality, which refers to structural links that represent a social tie, has not been considered in our study. Three cost and benefit constructs have been adopted from the Kankanhalli et al. (2005) model: loss of knowledge power, codification effort, and organizational reward. The model thus covers all three of the motivational constructs included in the Bock et al. (2005) model: anticipated extrinsic rewards, anticipated reciprocal relationships, and sense of self-worth (as self-rated expertise).

Figure 1: Research Model (Intention to share knowledge)
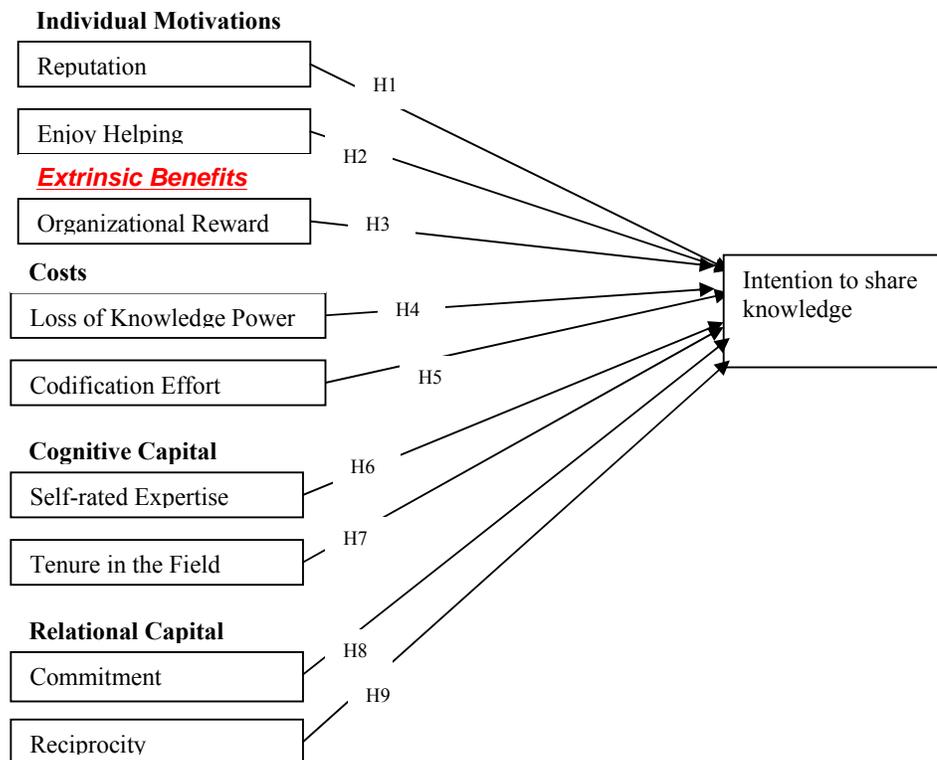
Research Methodology

The research hypotheses were tested using data collected through a survey. Table 1 provides formal definitions of the constructs. These constructs were developed and measured using questions adapted from previous studies to enhance validity. The 59 questions in the survey instrument were measured using a five-point Likert scale anchored from "strongly disagree" to "strongly agree", and a six-point Likert scale to measure self-reported usage anchored from "don't use at all" to "use several times a day". All of the questions were subjected to a two-stage conceptual validation based on procedures prescribed by Moore and Benbasat (1991). In the second stage, four financial systems trainers sorted the questions, according to the construct categories provided, with an average hit rate of 91%. Data were

collected from members of the Financial Management Communities of Practice on the AF portal. The Financial Management area consists of six communities of practice: Budget, Cost, Financial Services, Policy, Combat Comptroller, and Unique Organizations. All members use the AF portal on a somewhat frequent basis to share and obtain information and knowledge. The AF portal contains large amounts of financial data and information and is considered by financial professionals in the Air Force as an excellent and reliable source for knowledge. Members actively participate in several different financial communities of practice as it is not uncommon for financial expertise to span several disciplines. Surveys were emailed to all registered users and, out of the 74 surveys sent out, 64 responses were received back (86%). The sample consisted of 4 financial managers, 10 financial analysts, 17 budget analysts, 17 financial specialists, and 15 financial systems trainers.

Table 1: Definition of Constructs

Construct	Definition and Reference
Reputation (REP)	The perception of increase in reputation due to contributing knowledge (Constant et al, 1996)
Enjoy Helping (EH)	The perception of pleasure obtained from helping others through knowledge contributed (Wasko and Faraj, 2000)
Self-rated Expertise (SRE)	The confidence in one's ability to provide knowledge that is valuable to the organization (Constant et al, 1996)
Tenure in Field – months (TIF)	The belief that individuals with longer tenure in the organization are more inclined to share knowledge (Wasko and Faraj, 2005)
Commitment (COM)	The belief in the good intent, competence, and reliability of individuals with respect to contributing and reusing knowledge (Lewicki and Bunker, 1996; Putnam, 1993; Coleman, 1990)
Reciprocity (REC)	The belief that current contribution to would lead to future request for knowledge being met (Davenport and Prusak, 1998)
Loss of Knowledge Power (LKP)	The perception of power and unique value lost due to knowledge contributed (Gray, 2001)
Codification Effort (CE)	The time and effort required to codify and input knowledge (Markus, 2001)
Organizational Reward (OR)	The importance of economic incentives provided for knowledge contribution (Ba et al, 2001)
Intention to Share Knowledge (ITS)	The degree to which one believes that one will engage in a knowledge-sharing act. (Constant et al., 1994; Fishbein and Ajzen, 1981).
Intention to Use Knowledge (ITU)	The degree to which one believes that one will engage in a knowledge-seeking act. (Davis, 1989).
Self-reported Knowledge Usage	The amount of time spent using the knowledge system.

Table 2: Hypotheses

H1:	Individuals who perceive that participation will enhance their reputations in the profession will share more knowledge in the community of practice.
H2:	Individuals who enjoy helping others will share more knowledge in the community of practice.
H3:	Individuals with higher levels of expertise in the shared practice will share more knowledge in the community of practice.
H4:	Individuals with longer tenure in the shared practice will share more knowledge in the community of practice.
H5:	Individuals who are committed to the community of practice will share more knowledge in the community of practice.
H6:	Individuals guided by a norm of reciprocity will share more knowledge in the community of practice.
H7:	Loss of knowledge power is negatively related to the intention to share knowledge.
H8:	Codification effort is negatively related to the intention to share knowledge.
H9:	Organizational reward is positively related to the intention to share knowledge.

Results

Partial least squares (PLS) was chosen as the structural equation analysis technique to test the hypotheses. Following the recommended two-stage analysis procedure adopted by Bock et al. (2005) and Wasko and Faraj (2005), the reliability and validity of the measurement model was first assessed, followed by the assessment of the structural model.

Measurement Model

The convergent validity of the measurement model was assessed by examining the average variance extracted (AVE) and the composite reliability (ICR). AVE scores greater than 0.5 are acceptable and indicate that the construct accounts for the majority of the construct (Wasko and Faraj, 2005). All AVE values were greater than 0.5. ICR values greater than 0.7 are acceptable and all ICR values were greater than this threshold with the exception of reciprocity (0.68). The discriminant validity was assessed by comparing the square root of the AVE with the square of the correlations among the constructs. It was found that each construct had highest correlation values for its own measures indicating that they shared more variance with their own measures than with the other constructs. Factor loadings and cross-loadings generated by PLS also verified adequate discriminant validity.

Structural Model

The proposed hypotheses were tested with PLS Graph 2.91 (Chin and Todd, 1995). To examine the specific hypotheses, t-statistics for the standardized path coefficients and p-values were calculated based on a two-tail test with a significance level of .05. Table 2 presents the results of the PLS analysis used to test the model. Because of the small sample size, it was not possible to test the full model, and analysis was performed in two stages. Stage 1 included the constructs included in the Wasko and Faraj (2005) model. The residual values of the dependent variables were used in stage 2, which included the constructs adopted from the model of Kankanhalli et al. (2005). Table 2 also includes two additional constructs (perceived usefulness and perceived ease of use), which were considered in the study but not covered in this paper.

The R^2 for the stage 1 model was .49 for intention to share. Hypotheses 1 and 2 proposed direct links between perceptions of enhanced reputation and enjoying helping, and the intention to share knowledge. The results indicate no such linkages. Hypotheses 3 and 4 suggested a link between high levels of cognitive capital and the intention to share knowledge. The results indicate that the path between self-rated expertise and the intention to share knowledge was negative and significant ($\beta = -.35$, $p < .01$). The results indicate that the path between tenure in field and the intention to share knowledge was not significant. Hypotheses 5 and 6 suggested a link between the dimensions of relational capital and intention to share knowledge. The results show a negative and significant link between commitment to the community of practice and the intention to share knowledge ($\beta = -.45$, $p < .01$). The results indicate no link between reciprocity and intention to share knowledge.

The R^2 for the stage 2 model was 0.01 for the residual intention to share knowledge. Hypotheses 7 and 8 proposed direct links between the dimension of costs and intention to share knowledge. The path between loss of knowledge power and intention to share was negative and significant ($\beta = -.32$, $p < .01$). There was no link between codification effort and intention to share knowledge. Hypothesis 9 proposed direct links between the dimension of extrinsic benefits and intention to share knowledge. No link was found between organizational reward and intention to share knowledge.

Table 3: Results of PLS Analysis

Stage 1 Results			
	Intention to Share		
	β		
Reputation	.10		
Enjoy Helping	.07		
Self-Rated Expertise	-.35***		
Tenure in Field	.19		
Commitment	-.45***		
Reciprocity	.20		
R-Square	.49		
Stage 2 Results			
	Perceived Usefulness	Perceived Ease of Use	Intention to Share - Residual
	β	β	β
Loss of Knowledge Power			-.32***
Codification Effort			-.04
Organization Reward			.10
Perceived Usefulness			.14
Perceived Amount of Knowledge	-0.25*	-.16	
Perceived Ease of Use	0.43***		
R-Square	.29	.03	.01

p<.10* p<.05** p<.01***

Discussion

The aim of the study was to test a model to investigate what factors influence the individuals' intention to share knowledge in a community of practice. The results provide some support for the theoretical model hypothesized and qualified support for some of the hypotheses. The results suggest that social capital factors (self-rated expertise and commitment) are the most significant predictors of intention to share knowledge. The results are not completely consistent with prior research regarding knowledge sharing. For example, in the Wasko and Faraj (2005) study, reputation and centrality in the community of practice have emerged as significant predictors of individual knowledge contribution. Kankanhalli et al. (2005) have identified enjoyment in helping others as having the strongest impact on knowledge contribution to electronic knowledge repositories. This study has found no significant relationship between individual motivation factors and intention to share knowledge. This may reflect the strong teamwork and collaboration norms in the Financial Management community of practice, which may reduce the significance of enhanced reputation or image as a motivator for knowledge contribution. This result is consistent with the finding of Kankanhalli et al. (2005).

The Wasko and Faraj (2005) study has not considered extrinsic benefits and costs, which are included in the Kankanhalli et al.'s (2005) model. This study has found that organizational rewards may not motivate individuals to contribute their knowledge. This is expected since monetary rewards and compensation are strictly prohibited in government service. Kankanhalli et al. (2005) have found that the relationship between organizational reward and knowledge contribution was both direct and contingent on identification.

However, Bock et al. (2005) have found that anticipated external rewards exert a negative effect on individuals' knowledge sharing attitudes in the context of Korean firms. Eisenberger and Cameron (1996) also argue that task-contingent rewards may in fact negatively impact extrinsic motivations.

Our results indicate that costs due to loss of knowledge power did negatively affect intention to share knowledge. This result is in agreement with the finding of Kankanhalli et al. (2005). It may reflect the natural tendency of individuals to hoard their knowledge (Davenport and Prusak, 1998).

The lack of a significant relationship between codification effort and intention to share knowledge disagree with the finding of Kankanhalli et al. (2005), which has revealed the deterrent effect of codification effort on knowledge contribution under conditions of weak generalized trust. This suggests the possibility that the Financial Management communities of practice may be characterized by strong generalized trust driven by strong teamwork and collaboration norms, which may induce individuals to ignore the effort needed for knowledge contribution.

This study has considered the cognitive and relational dimensions of social capital as moderating the influence of cost and benefit factors on intention to share knowledge. The results show that tenure in the field (in this case the Financial Management community) did not influence intention to share knowledge, but that self-rated expertise did. Wasko and Faraj (2005) have found that tenure in the field positively affected knowledge contribution. This study has found that self-rated expertise had a negative relationship to intention to share knowledge. This suggests that individuals who value their own expertise higher may have tendencies to hoard their knowledge more. The negative relationship between loss of knowledge power and intention to share knowledge further gives support to this interpretation. Wasko and Faraj (2005) have found no link between self-rated expertise and knowledge contribution. They propose further research on the importance of experience and expertise in the practice and their measurement.

In the area of relational capital, the results were split and inconsistent with prior studies. The results indicated a surprising negative relationship between commitment and intention to share knowledge. It needs to be checked that multicollinearity has not caused this relationship. Wasko and Faraj (2005) have also identified a negative relationship between commitment and the helpfulness of contributions and realized that commitment had a suppressor effect. This effect also should be checked for.

The lack of a relationship between reciprocity and intension to share knowledge suggest that individuals may share their knowledge even though they expect that their help will not be reciprocated (Wasko and Faraj, 2005). This runs contrary to previous studies where reciprocity was found to play a significant role in collective action (Putnam, 1995b; Shumaker and Brownell, 1984). As Wasko and Faraj (2005) suggest, in electronic networks of practice reciprocity may be extended to include third parties and expectation of direct reciprocity may not influence knowledge contribution.

Results of this study must be interpreted in the context of its limitations. Given the small sample size and the specialized nature of the Financial Management community of practice, a larger sample size would bring more statistical power to the overall results. A broader sample however, may provide more generalized results and may not be indicative of a tightly interwoven community of practice. Due to the small sample size, a full model with all 12 constructs could not be adequately tested. In order to compensate for this limitation, the results were compared against prior research. By running stage 1 of the model and using the residual values of the dependent variables in stage 2, we were able to test whether the additional variables were able to explain any of the remaining variance in the dependent

variables after controlling for the effects of stage 1. It must also be noted as a potential limitation that one of the ICRs was slightly below the acceptable value of 0.7.

Conclusion

As organizations are increasingly investing more resources in knowledge management initiatives, the particular capabilities they need for creating and sharing knowledge in order to realize competitive advantage are receiving attention. The aim of this study was to develop an understanding of the factors influencing participants' intention to share knowledge in an electronic network of practice. A theoretical framework derived from the theories of social capital and social exchange has contributed to the development of an understanding of some of the factors and has shown the value of these theories for explaining knowledge sharing in electronic networks of practice. A model of intention to share knowledge in an electronic network of practice has been developed based on this framework and empirically tested using a survey in the Financial Management Community of Practice in the USAF Portal.

The study has identified some of the factors that influence and some that do not influence intention to share knowledge in a particular electronic network of practice. The results of the study offer suggestions for leveraging organizational knowledge resources. However, generalization of the results to other contexts requires caution. The findings indicate that reputation, enjoying helping, tenure in the field, reciprocity and organizational rewards do not significantly affect intention to share knowledge. The results also indicate that self-rated expertise, commitment, and loss of knowledge power all negatively influence intention to share knowledge. These results suggest that leveraging organizational knowledge resources should not be viewed as a process that can be quickly achieved though external rewards. Individuals' tendencies to hoard their knowledge may be difficult to overcome and may depend on the organizational culture and climate in complex relationships. Deeper understanding of these relationships is crucial for knowledge management initiatives to achieve the competitive advantage they aspire to.

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Information and Communication Technologies in the Nigerian Economy

Sunday Mauton A. Posu
Olabisi Onabanjo University

Most developing nations have embarked on various reforms that foster the use of ICTs in their economies. These reforms tend to yield little or minimal benefits to economic growth and development, especially when compared with the developed countries of the world. Technological advancement is known to impact fast rate of economic development. In Nigeria, policy on adoption of Information and Communication Technologies was initiated in 1999, when the civilian regime came into power of government. The operations of the licensed telecommunication service providers in the country has created some well-felt macroeconomic effects in terms of job creation, faster delivery services, reduced transport costs, greater security and higher national output.

This study intends to investigate the emerging roles of ICTs on Nigerian economy, and to evaluate the factors that influence the decisions of investors in the Nigerian telecommunications sector.

Ordinary Least Square Method of Regression for the period 1999 – 2004, shall be employed. This period is considered appropriate in that, it was the time that policy on ICTs was adopted. The paucity of data prior to this time also poses restriction on meaningful econometric analysis.

Significant and positive relationship between ICTs and economic growth is expected as it is portrayed in some economic literature.

While telecommunication service providers receive commensurate profit on their investment efforts, the regulation from the government should ensure competitiveness. This strategy will increase the quality of the services offered, and possibly at cheaper price.

Introduction

Attempts to ensure sustainable economic development and poverty reduction of most nations usually involve the development of agriculture, mining, industrial as well as the service sectors. The Industrial Revolutions in Europe and America, generally and specifically, have been premised on technological breakthroughs. During the late 1990s, Information and Communication Technology (ICT) was the largest contributor to growth within capital services for both Canada and the United States (Harchaoui, 2002). Similar trend has been observed with the economic development of China, Korea, Taiwan, India, South Africa, and other emerging economic powers (Mafe, 2000).

At the wake of 2000, the Federal Government of Nigeria embarked on an aggressive drive towards the provision of more efficient services in the nation through its privatisation and deregulation policies. The policy thrives led to the establishment of National Telecommunication Policy in December 2001. The policy, among other things, recognised the need for the establishment of an enabling environment for deregulation and rapid expansion of the telecommunication services in the country. The mission statement of the government was to use ICTs for Education, Creation of Wealth, Poverty Eradication, Job Creation, and Global Competitiveness. The policy objective was to develop globally competitive quality manpower in ICTs and related disciplines. This entails developing a pool of ICT engineers, scientists, technicians and software developers. Consequently, attractive career opportunities will emerge in addition to development of *Made in Nigeria* softwares and computer components that can earn the nation some foreign exchange. The implementation of ICTs policy led to the adoption of Global System for Mobile-Communications (GSM) and its related components in Nigeria.

In Africa, provision of public infrastructure is grossly inadequate and poor. Necessary telecommunication services, as public infrastructure, needed for meaningful investment are lacking and, where found, are very costly. Teledensity in Africa and Nigeria, in particular, is very low. In the early 1990s, only one out of every 1,000 people in Chad had a telephone and there was just ten percent chance of completing a local call (Easterly 1996). The situation is worse in Nigeria (Soludo, 1998) with its teeming population. Prior to the introduction and adoption of GSM services in Nigeria, it costs about US$10 to fax one page message to America or Europe, and about US$8 to do the same task locally when the phones were functioning properly. The number of installed telephone lines was grossly inadequate to equate demand. This phenomenon was responsible for poor call completion rates, subscriber dissatisfaction, and hence, loss of revenue.

The introduction of the GSM in Nigeria was to expand the teledensity in the country and to make telephone services cheaper and accessible to the common person as it had been introduced in some African countries like South Africa, Ghana, and Benin Republic among others. To date, at least four competitive GSM service providers have been fully licensed in the country. These are Mobile Telephone Networks Limited (MTN), V-Mobile Nigeria (V-go), Globacom Nigeria Limited (glo), and Nigerian Mobile Telecommunications (Mtel). These Telecommunication Networks have created significant effects on the gross domestic product (GDP) of Nigeria in terms of job creation, communication linkages, connectivity, security of lives, and reduced transport costs among other.

Past studies on the Nigerian economy have bothered on the challenges and roles of ICTs (Ndukwe, 2003, 2004; Igwe, 2005). Thus, this paper, specifically, investigates the emerging growth effects of ICTs on Nigerian economy particularly since the introduction of GSM services, and evaluates the factors that influence the decisions of investors in the Nigerian telecommunications sector. The paper has three other sections. Relevant literature on

telecommunication and theoretical basis are reviewed in section two. Section three presents the methodology, analysis, and interpretation of the results. Section four concludes the study.

Review of Literature and Theoretical Analysis
The Conceptual and Theoretical Framework

ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private information. According to the United Nations Economic Commission for Africa (1999), ICTs cover Internet service provisions, telecommunications and information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities. The Commission admits the definition as being quite expansive. It is not uncommon to find definitions of ICTs that are synonymous with those of information technology (IT). Drew and Foster (1994) defined IT as the group of technologies that is revolutionising the handling of information. It is taken to embody a convergence of interest between electronics, computing and communication. Chowdhury (2000) posited that ICTs encompass technologies that can process different kinds of information (audio, video, text, and data), and facilitate different forms of communications among human agents, and among information systems. Duncombe et al (1999) simplify the definition by describing ICTs as an "electronic means of capturing, processing, storing, and disseminating information".

Theoretically, two Schools of Thought explain the relationship between telecommunications and development. These are the *Technophilic* and the *Technophobic* views. The Technophiles believe that ICTs impact positive effects on development. This perspective argues that in the various communities and sectors of the economy, ICTs will expand productivity, improve employment opportunities, and upgrade the quality of work in many occupations. Moreover, ICT will offer many opportunities for small-scale, independent, and decentralised forms of production. Regarding developing countries, technophiles envision that technology will aid developing countries to leapfrog stages of development (Castells 1999; Mansell & Wehn 1998; Nulens & Van Audenhove 1998).

On the other hand, the technophobes regard ICTs as having negative effects on development and widening the information gap between the rich and the poor, the literate and the illiterate. While admitting that ICTs could have profound changes on a society, Van Dijk (1999) believes that applications of ICTs and their transformative nature have been greatly exaggerated. ICTs may destroy more jobs than they create; the gap between the rich and the poor may widen. Mansell (1999) saw the huge capital investments required on ICTs as diverting resources from other sectors of the economy that could have greater development impacts. On economic level, this perspective forecasts a perpetuation of the capitalist mode of production, with further managerial control over the means of production. In most countries, it foresees massive job displacement and 'de-skilling'.

Empirical Review

Many economists have observed a positive correlation between the level of telecommunications use and some indices of economic well being. Jipp (1963) studied the relationship between the income of a nation and telephone density, using data for different countries, and found a positive correlation between the two. Bebee, et al (1967) also studied the relationship between telephone facilities, their uses, and economic performance using data from 29 countries at different stages of development. They constructed three indices: a telephone index representing the availability of telephone facilities and their uses, an

economic performance index, and a development support index representing other supporting factors needed in economic development. The analysis shows a strong positive correlation between the telephone index and the economic performance index. It explains the role of supporting factors in enhancing the contribution of telecommunications to economic development. Hardy (1980) and Moss (1981) found a strong positive correlation between telephone facilities and economic development at the macro level. Conversely, absence of modern technology is a major obstacle to growth and poverty reduction. These assertions are the general conclusion of two conferences jointly organised by the Telecommunication Development Bureau of the International Telecommunication Union and the International Relations Program of Webster University in Geneva, in September 1996 and February 1998 under the title "Telecommunications and Economic Growth" (Abutaleb, et al, 2001)

Nandi, and Dholakia, (1994) established a relationship between investments in telephone infrastructure and economic development. They examined the connection among a number of factors such as education, energy, telephones, other physical infrastructures and economic development. The results of the multiple regressions adopted in the analysis suggest that simultaneous investment in development inputs such as education; telecommunications and other physical infrastructures are complementary in the promotion of economic growth. Saunders, et al (1994) conducted several studies examining the correlation between the density of telephone lines and economic development. Madden, et al (1998), also, examined the empirical relationship among gross fixed investment, telecommunication infrastructure investment, and economic growth for a sample of transitional countries of Central and Eastern Europe. The results of the studies show a positive relationship between investment in telecommunications and national economic growth. Empirical evidences show that investment in ICTs enhances efficiency of economic activities, and that economic growth stimulates the demand for telecommunications and other ICTs' components.

The impact of telecommunications on growth was first found by Hardy (1980) based on data from 45 countries, with the greatest effect of telecommunication investment on GDP found in the least developed economies, and the smallest effect, in the most-developed economies. Garbade, et al (1978), observed strong statistical support for the hypothesis that the two innovations in communication technology (the Telegraph and Trans-Atlantic Cable) led to efficient market worldwide through significant and rapid narrowing on inter-market price differentials. Leff, (1984) argued that firms can have more physically dispersed activities with increased telecom services, and, thereby, enjoy economies of scale.

Sridhar and Sridhar (2000) found strong correlation, based on several regressions and instrumental variable methods, between investment and productivity growth in developing countries, which imply that developing economies have to import and install machinery and equipment, in order to grow. Using the Peterson Index, Cronin, et al (2002) shows how basic telecommunication infrastructure can create a "digital provide" by making markets more efficient through information dissemination to isolated and information-deprived localities, and improve the living standards of the poor, which in turn accelerate growth.

According to Balimoune (2002), the global economy has been driven by a greater integration of world markets and a spectacular growth of ICTs. Country data reveal a global digital divide. It is feared that the so-called New Economy will reinforce the gap between rich and poor nations, and increase income and spatial inequalities within countries. There is a growing body of literature focusing mainly on the effects of the New Economy on industrial countries. The empirical evidence indicates that ICTs diffusion has a significant positive impact, in varying degrees, on GDP growth (Oliner and Sichel 2000; Pohjola 2001; and Jalava and Pohjola 2002).

Braga (1998) built a case that concludes that the countries with greater prospects of economic performance in the New Economy are those that can rely on widespread access to

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communication networks; the existence of an educated labour-force and consumers; and the availability of institutions that promote knowledge creation and dissemination. This may suggest that developing countries are at a disadvantage in comparison to developed countries. Similar sentiments are shared by Mansell & Wehn (1998). Brown (2001) argued that ICTs are simply tools. He maintained that no single tool can solve a global problem, such as, poverty and its attendant socio-economic problems, which have such complex and multiple causes. He stressed the role of educated labour-force in this information age.

Chowdhury (2000) noted that many sceptics have not seen the role of ICTs in efforts intended to alleviate poverty and bring food security to developing countries. The author acknowledged that the problem of poverty alleviation is complex. Efficient production systems and physical infrastructure are a few of the necessities. According to Bayes, et al (1999), only half of all telephone calls are related to economic purposes such as discussing employment opportunities, prices of the commodities, land transactions, and that, the average prices of agricultural commodities were higher in villages with phones than in villages without phones. The New Economy may offer a new channel for economic growth that may allow developing countries to catch the development train faster, and perhaps ensure a more sustainable ride.

The Nigerian ICTs Experience

Following the release of a new telecommunication policy in year 2001, several Private Telephone Operators, Fixed Wireless Access Operators, Internet Service Providers, and a Second National Carrier have begun operation in Nigeria (Ndukwe, 2003). The activities have increased and promoted competition in the industry, resulting in exponential growth in the number of telephone lines. Within the first six months after the take-off of the GSM in Nigeria, more than 350,000 mobile lines were activated. The existing operational fixed lines rose from 450,000 in December, 2000 to 888,854 by March, 2004. At this time, mobile lines increased to 3.8 million (Akwani, 2005)

Recognising the seemingly insatiable appetite of consumers for phone services, and the potentials of the Nigerian market, investors pumped in US$2.110 billion into the sector by December 2002, US$2.55 billion by June 2003, and over US$4.0 billion by March 2004. The initial investment was just US$50 million as at the end of 1999. This represents a percentage increase of over 8,000. According to Ndukwe, (2004), investment in the telecommunication sector ranks second only to the oil industry. Of all the applications of ICTs, the use of mobile phones is on the increase in most developing countries while internet usage is considered to rank next to phone usage, especially in Nigeria.

Specifically, ICT has successfully aided the following sectors of the Nigerian economy: the Industrial/Manufacturing, Education, Transportation, Tourism, Health, Banking, Commerce, Agriculture, Government Services, Defence, Sports, and Rural Development. ICTs played vital roles in the enumeration of the 2006 population census in Nigeria, and the successful hosting of the 15th National Sports Festival, 2006. The Network Providers in Nigeria has been devoting huge sums of money to support sports. e-voting is in the pipeline, with strong support from major stake holders, against the on-coming national election in 2007. It is expected that the Network Providers will soon devote their assistance towards research in the higher institutions of learning in Nigeria. The impacts of ICTs have been noted to influence the environment, employment, poverty alleviation, attraction of foreign funds, and empowerment for the disabled. According to Akwani (2005), the fastest growing employer of labour in Nigeria today is the telecom industry -- specifically the wireless telephone sector that provides services to individual customers using the GSM. The teledensity (fixed and mobile lines) in Nigeria has jumped from 1 line to 440 persons in 1985

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to 1 line for every 263 persons in 1997 and 1 to 18 in 2004. As at March, 2004, the sector created about 5,000 new direct jobs and 400,000 indirect new jobs. These appear in the form of the various ICT engineers, scientists, technicians, software developers, accountants, managers and clerks employed by the network operators, and individual small scale related activities. Table 1 shows a picture of how the introduction of ICTs has been able to generate employment at the grass-root. The average monthly profit from Table 1 is commensurate in the process of alleviating poverty since the Nigerian per capita income is about US$320 - implying below US$1.00 per day – and US$1.00 exchanges for about ₦140.00

Table 1: Grass-root Employment Capacity of ICTs

Business Line	MTN		glo		V-go	
	Range/day	**Avg/month**	**Range/day**	**Avg/month**	**Range/day**	**Avg/month**
Cost (₦)	1400-5600	3135	450-1840	1055	950-4930	2269
Revenue (₦)	1860-7500	4105	570-2880	1537	1350-6750	3164
Profit (₦)	380-1900	971	110-1040	482	350-1820	895
Profit/Cost		31.0%		45.7%		39.4%

Source: Culled from Akinsanya, (2004)

Methodology, Analysis, and Interpretation
Data Source and Analytical Technique

The data required for this study are of secondary source. The data relate to the aspects of ICTs and economic development such as investment in the telecommunication sector, gross domestic product, population density, and number of computer users. These data are sourced from the publications of the Central Bank of Nigeria (CBN), and World Bank. This study adopts ordinary least square (OLS) analysis to examine the effects of ICTs on economic development of Nigeria.

The Model

This study adopts a model that is similar to that of Alleman, et al. (2004), and Bezmen, et al (2003). Both the introduction and application of ICTs influence the performance of any economy. As found in most studies, economic performance is evaluated with data on Gross Domestic Product (GDP). Accordingly, $LogGDP = \alpha_0 + \alpha_1 LogICTs + \mu$

(1)

Several variables are viewed as components of ICTs, but this study adopts

$LogICTs = \varpi_0 + \varpi_1 LogTel.Inv + \mu$ (2)

Substituting equation (2) into equation (1) gives

$LogGDP = \delta_0 + \delta_1 LogTel.Inv + \mu$ (3)

This study further considers investment in telecommunication sector to be influenced by population density and number of computer users. Thus,

$Tel.Inv = \lambda_0 + \lambda_1 Dens + \lambda_2 Comps + \mu$ (4)

The whole structure of ICTs, in Nigeria, is taken to include investment in the telecommunication sector (Tel.Inv), the number of personal computers (Comps), the population per square kilometre (Dens). Equations (3) and (4) are regressed. Equation (3) measures the role of investment in the telecommunications sector on economic growth. Equation (4) considers the main factors influencing investment in the telecommunications sector, and thus, economic growth in Nigeria. Investment in the telecommunication sector is a necessary component of ICTs. Acquisition of personal computers will facilitate computer

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literacy, and internet usage. High population density, as found in urban centres and cities well-populated by students, creates more pressure on the supply and demand of ICTs facilities. The δs and λs in equations (3) and (4) are the parameters to be estimated while μ is the zero-mean stochastic error variable, which also controls the other variables that influence GDP. It is expected that increased investment in the telecommunication sector will cause GDP to rise ($\delta_1 > 0$). Similarly, positive impacts are expected through population density ($\lambda_1 > 0$) and number of personal computers ($\lambda_2 > 0$).

Analysis of Data and Interpretation

The data for the period 1999-2004 were employed for the models. 1999 was the year of new democratisation in Nigeria and the consequent adoption of ICTs policy reforms. The results of equation (3) shown in Table 2 indicate that all the coefficients are statistically significant at the one percent level. The Durbin-Watson statistic also has a value that is close to 2.0. The Adjusted R-square is 0.766 and by implication, about 77 percent variation in GDP during 1999 – 2004 is attributable to investment in telecommunication.

All the parameters, λs, in equation (4) are statistically significant. The value of Durbin-Watson statistic does not indicate serious autocorrelation problem in the model and the F-statistic is significant. By the Adjusted R-square, the explanatory variables of population density and number of personal computers account for 97 percent of the factors influencing investment in the telecommunication sector. Population density explains consumer demands for the services of ICTs. Computer usage, too, implies literacy and internet usage (Bezmen & Depken, 2003).

The Normality test on equation (4) is based on the following:

H_0: Residual errors are normally distributed
H_1: Residual errors are not normally distributed

The result shows that the residuals are normally distributed and bell-shaped. The Jarque-Bera statistic is 0.74 with the p-value of 0.69 while theoretical $\chi^2_{2,0.05}$ is 5.99. Since 0.74 is less than 5.99, the null hypothesis cannot be rejected. This conclusion conforms to the bell-shape of the histogram that indicates normal distribution.

Table 2: Results on Equations (3) and (4)

	Equation 3	Equation 4
	Dep var: Log(gdp)	Dep Var: Log(TelIinv)
C	11.176 (10.862)*	28.787 (63.992)*
Log(Tel.Inv)	0.550 (4.171)*	
Log(DENSITY)		17.667 (4.284)*
Log(COMPS)		0.150 (2.675)**
R-squared	0.813	0.984
Adj R-squared	0.766	0.973
F-stat	17.397	92.548
Prob(F-stat)	0.004	0.002
D-W stat	1.958	2.103

*Significant at the 1% level; **Significant at the 5% level; t-statistics are in parentheses.

Source: Researcher's Compilation, (2006)

Figure 1: **Normality Test on Equation (4)**

Series: Residuals	
Sample 1999 2004	
Observations 6	
Mean	1.49E-14
Median	-0.015583
Maximum	0.094981
Minimum	-0.053582
Std. Dev.	0.056416
Skewness	0.779145
Kurtosis	2.278028
Jarque-Bera	0.737378
Probability	0.691641
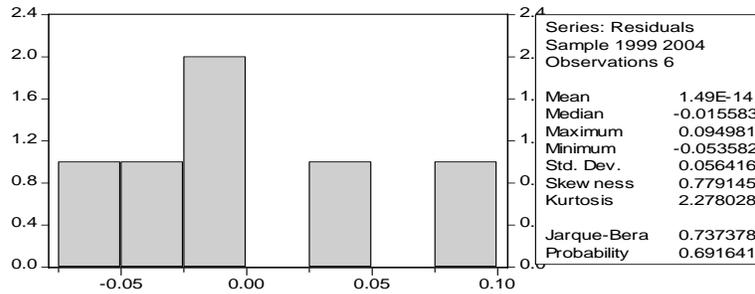
Source: Output of Regression Results, (2006)

Conclusion

ICTs can aid sustainable economic development when used appropriately, with the full participation of all stakeholders, especially the developing economies. The intrinsic value of ICTs lies not in easing communications and information, but in enabling growth and development. In a country like Nigeria, where a vast section of the population is below the poverty line, ICTs offer a chance to empower the residents and transform them into more productive human capital.

Traditionally, a nation moves through three stages of economic development, from agriculture to manufacturing and then to services. However, in the current information era, it is possible to move in a parallel direction and not necessarily follow sequential development. But this would require national efforts in human capacity building.

There are some factors, however, militating against the smooth development of ICTs in Nigeria. These include erratic power supply, illiteracy, cultural barriers, lack of computer skills and technological know-how, inadequate access to computers and computer networks as a result of the digital divide, and high cost of internet access. The government should therefore fine-tune its policies in view of these lapses in order to bridge any existing gaps between the economy and the rest of the world.

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Technology

The Role of Education and ICT in Economy

Mediha Tezcan
Anadolu University

Knowledge and technological innovation play a crucial role in economic activities in parallel with the technological infrastructure recognized by managers, scientists, and engineers, together with the related telecommunications, information systems, environment, microelectronics machinery and computer-based transportation. As it could be easily seen, technical progress has direct effects only on production. Through process or product innovation, it is evident that to maintain a kind of feedback on education and human capital formation is the natural result of the investment inputs closely connected with the scholastic fashion. Education and technological change are major determinant of economic, cultural, political, social, demographic changes. It must be borne in mind that considering the global aspect of the economic system, one should emphasize the importance of the inclusion of information and communication technologies (ICT) in education, which naturally result in the productivity of education outputs. In parallel with the close relationship between human capital and social capital, which are closely connected with each other and at the same time trigger each other. All of them aim at the well being of economy. It related theoretical literature framework of our study would be analysed in the light of variable such as globalisation, ICT, education, human capital, social capital, and economy well being.

Introduction

Knowledge and technological innovation play a crucial role in economic activities in parallel with the technological infrastructure recognized by managers, scientists, and engineers, together with the related telecommunications, information systems, environment, microelectronics machinery and computer-based transportation. As it could be easily seen, technical progress has direct effects only on production. Through process or product innovation, it is evident that to maintain a kind of feedback on education and human capital formation is the natural result of the investment inputs closely connected with the scholastic fashion. Education and technological change are major determinant of economic, cultural, political, social, and demographic changes. It must be born in mind that considering the global aspect of the economic system, one should emphasize the importance of the inclusion of information and communication technologies (ICT) in education, which naturally results in the productivity of education outputs, and well-being.

The purpose of this study is to conduct a theoretical review on the role of education and ICT in economic growth and development. The first of the study is focused on the importance of education, globalization, and human and social capital in time. The contributions and the opportunities provided by the ICT on the process of education were examined. Subsequently, the increase in the output of education provided to the economy, and its contribution to the inventories of human and social capital were highlighted. Then, the impacts of the increase in the output of education, on the increase of human and social capital, and consequently, the enhancement created by all these factors on economic growth and development, were examined in detail on a theoretical platform.

Importance of Education

An education is based on scientific humanism, which focuses on the use of technological and scientific advances to enhance the welfare of humans and democracy. Unlike many later statements, education for scientific humanism is worth reading because the emphasis is on individual control and benefits (Spring, 1998: 206). The concepts of human capital and human resources render education primarily instrumental to economic prosperity (Spring, 1998: 6). These concepts dehumanise people and place them in the same category as raw materials such as minerals.

Education is supposed to solve the problems of knowledge-based economic growth, unemployment, reduction of poverty and increasing inequality in wealthy, better health and alleviation of population pressures, more effective democracy and political stability, lower crime rates, sustainable environmental quality, and the social and personal disruption caused by constant technological change (McMahon, 1999: 270). All are vital aspects of true development. All are also fundamental to the quality of life for individual families and hence too human welfare. The proposed solutions are to (Gradstein, 2005: 3):

- Building human capital by teaching skills that directly enhance productivity,
- Providing screening mechanism that identifies ability,
- Building social capital by instilling common norms of behaviour, and
- Providing a consumption good that is valued for its own sake.

Education is considered a part of a collaborative dynamic process to enable growth and development in support of a modern inclusive society (Ottersten, 2004:144). Education is a key driver in the creation of knowledge to accelerate diffusion and encourage innovation. Hence, education and training will have both direct effects in the market and indirect effects in the build up of research and development and implementation of innovation.

The generally accepted results, determined as the result of various studies that were conducted on the economies of the developing countries pertaining to the effects of the learning and education process on the economy, are outlined as follows (Gümüş, 2005, 30):

- While the rate of return declines during the period of investment on the learning and education process; in time, as the outcome of the learning and education process, the rate of return increases both within the relevant countries, and as well as among the different regions of the concerned countries.

- In developing countries where the human resources consisting of skilled labour are scarce, the level of education that yields the highest rate of return is the level of primary education.

- Developing countries allocate "between" 1.4% to 10.4% of their national income to investments concerning learning and education in order to improve the level of skilled labour.

- In sectors that demand skilled labour, opportunities for on-the-job training create a reduction in the labour costs as the result of the enhancement of learning experience; hence the increase in the efficiency helps development grown. Meanwhile, the standpoint of the employees, on-the-job training provides opportunities for more rapid salary increases.

Concurrent with the advancement of technology, skilled labour becomes more efficient. Investments in training and education   in the areas that are needed by the sectors operating in the economy enhance the capacity of the individuals in creating and using knowledge by using physical capital, and through this way, the new inputs are both harmonized and used in an effective manner, and the efficiency is enhanced in all sectors.

Educations and Globalisation

Globalisation provides a backdrop for analysing economic and social changes and concomitant changes in the education and learning sector. The globalizing education and learning economy are two most significant aspects of contemporary economic and social life. On the one hand, there is growing agreement that knowledge is now at the very core of economic welfare and development. On the other hand nations, regions, industries, and firms with a faster rate of growth are those, which more successfully manage to generate and apply knowledge. The crucial role of knowledge is now preached by a variety of academic, business, and policy sources (Archibugi, 2001: 1).

A global economy requires governments to develop a new approach, not only to trade fiscal policies but also structural policies. As the scope for state intervention in the economic sphere has become more and more constrained, policy makers have increasingly had to shift their attention to the 'residual' factors in the production function, principally technology and human capital (Tuijnman, 2003: 472).

It is important to emphasize how the 'education and learning' economy and the 'globalizing' economy are strictly connected (Archibugi, 2001: 2). It is obvious that knowledge and learning have always been a crucial component in human systems. It is connected to the opening of new scientific discoveries and technological innovations. A circular process has taken place. On the one hand, the development of an integrated world economy has allowed the acquisition of information, expertise, and technology at a faster pace and often at lower costs than in the past. On the other hand, the current phase of globalisation has been nurtured by a generation of new technologies. The major technological advances of the last quarter of a century have in fact occurred in fields, which allow the production, communication, transmission, and storage of information. ICTs have, in other words, acted as the material devices to allow globalisation to occur. Finance, production, media, and fashion would not be as global as they are today without the generation of new technologies. In this

sense, the 'education and learning', and 'globalizing' dimension of the world economy strongly reinforce each other.

Global economy is dependent on the quality of education, whereas the goals of education are dependent on economy (Spring, 1998: 6). Under these circumstances, education change as the requirements of economy changes. As a result, human capital theory now dominates discussions of education for the global economy.

Human and Social Capital

Human capital theory amounts to the proposition that education or training can be regarded as investment with future material pay-offs, analogously to investments in physical capital (Ashton, 1996: 14, OECD, 2001: 11, OECD, 1998: 9). Education policy based on human capital concepts can address only to the first in this list of causes of economic inequality (Spring, 1998: 225). It is economic promises, education policies based on human capital theories. Human imagine being income and profit making machines. Human value is defined by an individual's worth in the labour market. The value of education becomes a function of human worth as measured by income.

Social capital is simultaneously an economic, sociological concept. 'Social' and 'capital' bring together the key terms in the disciplines of sociology and political economy (Szreter, 2000: 57). A satisfactory definition therefore involves the language of both of these disciplines. One narrow meaning of social development is public welfare policies of health, communicative, social security, and housing (Pieterse, 2004: 123, Szreter, 2000: 69).

The relationships between social capital and human capital are theoretically important. Some scholars have proposed that social capital helps produce human capital (Lin, 2003: 97). Well-connected parents and social ties can indeed enhance the opportunities for individuals to obtain better education, training, lifelong learning, and skill and knowledge credentials. On the other hand, it is clear that human capital induces social capital.

Table 1: The Relationship between Human Capital and Social Capital

	Human Capital	Social Capital
Focus	Individual	Relationships
Measures	Duration Qualifications	Membership/participation Trust levels
Outcomes	Direct: Income, Productivity Indirect: Health, Civic Activity	Social Cohesion Economic Achievement More Social Capital
Model	Linear	Interactive/Circular
Policy	Skilling, Accessibility and Rates of Return	Citizenship, Capacity-building, and Empowerment

Source: Field: 2000: 250.

There is a relationship between human capital and social capital. Human capital and social capital are not in direct opposition to each other, but they are theoretically and pragmatically in a relationship of tension (Field, 2000: 250-251). To summarise distinctive features of human capital and social capital, one should point to their complementarity of purpose and process, rather than to any strategic opposition. If human capital describes individuated economic capacities, social capital captures the quality of experience and the ways in which relations between individuals and groups shape it. If human capital assumes linearity, social capital is about interactive and circular relationships. Yet, there is ambiguity among scholars as to whether social capital should be treated as an independent force or an inseparable component of enquiry into selected aspects of capital with many facets. For some,

all behaviour are subordinated to the furthering of economically rational interests; others lament this as the essence of the individualised, reductionist and commodifying neo-liberal project. Some conceptualisations present social capital as a prevailing, if varying, condition and consequence of multiple activity domains, among which family, work, community, nation feature prominently (see Table 1).

The effects of human capital on the economic development can be classified under the following groups (Gümüş, 2005, 51-65): Economic Growth: [Enhancement of the efficiency of physical capital; increase of productivity; creation of new employment opportunities and the definition of the technological development and the effects of diffusion.], distribution of income, regional development and social capital.

The Contribution of ICT and Education to Economic Growth
Technology Progress and Education

As the outcome of the emergence of global integration and the development of the knowledge-based economy, the importance of economic growth has increased within the process of economic growth.

Human capital enables the production and utilization of technological knowledge. Moreover, it facilitates the harmonization of the labour power within the technological development and contributes to the process of technological progress (Gümüş, 2005: 54, McMahon, 1999: 19-33). As the result of these developments, the productivity of human is further enriched. Human capital affects the economic growth and this situation creates the emergence of positive economic externalities. These positive externalities accelerate the economic growth. Countries that accomplish a higher rate of growth give further priority to the investments in human capital. This theoretical explanation is available in the literature concerning inner growth.

As the outcome of the emergence of positive economic externalities, technological development and the increase of efficiency and employment opportunities, the human capital becomes even more effective than the physical capital in economic growth (Gümüş, 2005: 55). In effect, an economic growth is accomplished, which is accompanied with the demand for qualified labour. These two economic factors interact and reinforce each other. Economic growth enhances employment opportunities, promotes higher wages for the employees and higher profits for the investors, encourages the investors and the governments to realize higher investments in human capital, and creates more abundant resources for the accomplishment of these purposes. Investments in human capital provide the necessary equipment for the creation of new employment opportunities for the labour force, and ensure a competitive edge for the global markets. All these effects facilitate and accelerate economic growth.

Information and Communication Technologies

Technology has evolved in the historical process through changes that formed consecutive epochs of development. When we examine the 'Industrial Revolution' in history, we mark that this process has evolved in history in three revolutions (Mokyr, 2002: 78-118, Warschauer, 2003: 13). The first followed the invention of the stream engine in the eighteenth century and was characterized by the replacement of hand tools by machines, mostly in small workshops. The second followed the harnessing of electricity in the nineteenth century and was characterized by the development of large-scale factory production. The third revolution came to fruition in 1970s with the diffusion of the transistor, personal computer, and telecommunication. 'Industrial revolution' is having a large impact on the word economy.

Like any other technological change, information technology is expected to increase productivity, enhance the quality of life, reduce price, and create new economic activities and new employment opportunities as well as generate wealth. It has also often been presumed that this impact can beneficial to all countries, regardless of their level of development. Computers and other information processing equipment have been much smaller than that of the railways some 100 years ago (see Table 2).

Tablo 2: The Three Industrial Revolutions

	First Industrial Revolution	Second Industrial Revolution	Third Industrial Revolution
Beginning	Late 18th century	Late 19th century	Mid-to-late 20th century.
Key technologies	Printing press steam engine, machinery	Electricity, internal combustion, telegraph, telephone	Transistor, personal computers, telecommunications, Internet
Archerypical workplace	Workshop	Factory	Office
Organization	Master-apprentice-serf	Large vertical hierarchies	Horizontal networks

The differences between the economies based on old industry and the new knowledge based economy are not only quantitative, but also qualitative. The world is undergoing a process of change not because the computer operators have replaced the secretaries and the typists all over the world, creating a substantial increase in efficiency, but rather because the human pursuits for survival and increase of welfare are now based on a completely different source of welfare. To the extent that agriculture based economy differs from the economy based on industry, the information technologies have created a radically different and innovative economy, which can be characterized as information based economy.

Today is information century. Historically, the dramatic rate of scientific and progress has taken place alongside two other epoch-making phenomena: economic growth and social and economic globalisation (Archibugi and Michie, 1998: 2, Pohjola, 2002: 10). Indeed, technological progress, growth, and globalisation describe the three most significant aspect of the long-term evolution of the world capitalist economy. These complex phenomena are obviously interrelated, although this does not mean that the linkages can be easily specified. On the contrary, the complex relationships between technical change, growth, trade, and education are still subject to debate and controversy despite the large body of theoretical and empirical research, which does exist. Production of information and communication technology good and services has contributed quite substantially to economic growth in many developed and newly industrialized countries.

ICT have altered the traditional learning environment by using new educational tools, that is to say, the concept of learning means the use of new multimedia technologies. In other words, the Internet improves the quality of learning by facilitating access to resources and services (Debande, 2004: 20). Thus, different strands which must be integrated into a comprehensive policy: infrastructure and equipment; high-quality educational multimedia services and content; training services and facilities for teachers and for lifelong learning; and dialogue and cooperation at all levels.

Four principal rationales have been identified to support the introduction of ICT in education (Debande, 2004: 20):

- Social, based on the recognition of the role played by technology in society, the need for education to reflect the concerns of society and to demystify technology for pupils/students;

- Vocational, driven by the requisite of ensuring that the system is preparing students for jobs which require skills in technology;

- Pedagogical, linked to the fact that technology will assist the teaching-learning process through better communication and higher quality material and hence enhance the teaching of traditional subjects; and

- Catalytic, through external effects on society by improving the cost-effectiveness of the delivery of educational services; on the education system by reshaping the transmission of knowledge and the acquisition of skills for disadvantaged communities.

Critical comparative educators have shown considerable concern with the impact of globalisation on and through education. By this they means a number of things (King and McGrath, 2002: 282):

First, the growing complexity of development cooperation, taken with the rapid advances in ICT, requires a new way of organising and sharing internally the data, information and knowledge that agencies already have. Second, the growing emphasis on policy and programmes rather than projects makes it more important that the 'agencies' 'partners' can access the 'right' knowledge on which to base policy decision. Third, the wide acceptance of the language of partnership in development emphasises that policy decisions should (be seen to) come from national learning rather than donor conditional ties. Fourth, there is 'developmentally useful knowledge' that has been synthesised and which ICT can ensure could be spread quickly and effectively to the poor, hence reducing their interrelated poverty and ignorance. Fifth, knowledge systems in partner countries need to be strengthened to improve their economic success, poverty reduction and ownership of their development path.

This has been a practical discussion that has been shaped by debates on aid effectiveness and lessons from management studies, rather than by philosophical debates about the nature of knowledge or recent, largely anthropological, critiques of the knowledge approaches of development.

Today's knowledge-based society is a broad concept related to the ongoing transformation process of production activities making knowledge more prominent as a factor of production and social integration (Ottersten, 2004:142). More broadly speaking, it simply reflects a society where there is a learning and knowledge process in each part of work and day-to-day life, thus building up human capital and regarding a stock of intellectual/intangible capital in products and services as the basis of the knowledge-based society. Open access to all knowledge generating, transforming and using activities for all citizens is considered crucial for social cohesion.

ICT intersect with the struggle for better education, and not always in ways that benefit marginalized learners (Warschauer, 2003: 152). The development of technology toward greater equality, inclusion, and access is in no way guaranteed but will depend in large part on the mobilizations, and communities to demand that technology be used in ways that serve their interests.

Figure.1. The Role of the Education and ICT in the Economic Growth
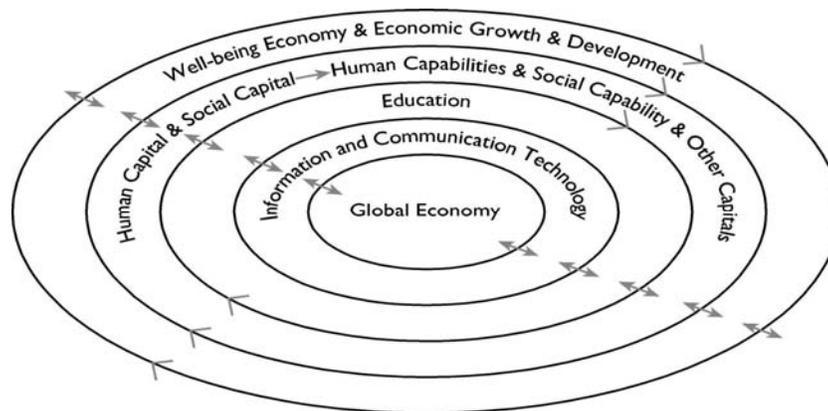
A rather simplified diagram showing an economic cycle is provided in Figure 1. Assuming that this economic cycle operates in the global economic system, and that the economic system possesses ICT; and assuming that in this economic system, we have mainly focused on the education variable, and have considered the other variables a constant values, it can be asserted that the economic cycle operates as follows: In global economy, an education output is yielded as the outcome of the process of education, which in turn, affects the capital of the country. In our figure, it has been defined as natural and physical capital as well as 'human and social capabilities'. Human capital represents the knowledge, skills and health embodied in individuals and social capital refers to the norms and Networks facilitating co-operation either within or between groups. Political, institutional and legal arrangements interact with human and social capital to influence well-being. Additionally, human and social capitals legal also have their worn direct links with natural and produced capital. The human and social capitals, which have a direct correlation with political, institutional and legal regulations, they play a complementary function for the conventional production factors in ensuring and strengthening of economic growth and development. The enhancement of efficiency and productivity as the outcome of the existing correlation between all factors of production and the effects of positive economic externalities has a critical importance in the accomplishment of both economic growth, and socio-economic development.

Conclusion

A backdrop for analysing economic and social changes is based on globalisation. Education and global economy are envisioned as having an interdependent relationship. Competition in the global economy is dependent on the quality of education, whereas the goals of education are dependent on economy. Under these circumstances, education changes as the requirements of economical changes.

Human capital enables the production and utilization of technological knowledge. Moreover, it facilitates the harmonization of the labour power within the technological development and contributes to the process of technological progress. As the result of these developments, the productivity of human is further enriched. Human capital affects the economic growth and this situation creates the emergence of positive economic externalities. These positive externalities accelerate the economic growth. As the outcome of the emergence of global integration and the development of the knowledge-based economy, the importance of economic growth has increased within the process of economic growth. That kind of service aiming at the well-being of the new generations who are far away from benefiting from the advantages of the new systems of education will allow them to make use of every kind of opportunity related to not only education but also other social aspects.

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MACROECONOMIC ISSUES

Using New Information Technologies for Modelling Data on Global Markets: An Efficient Interaction between "Artificial" Human Brain and Economics

Alper Özün
Is Bank

Recent development of information technologies and telecommunications have given rise to an extraordinary increase in the data transactions in the financial markets. In large and transparent markets, with lower transactions and information costs, financial participants react more rapidly to changes in the profitability of their assets, and in their perception of the risks of the different financial instruments. In this respect, if the rapidity of reaction of financial players is the main feature of globalized markets, then only advanced information technologies, which uses data resources efficiently are capable of reflecting these complex nature of financial markets.

The aim of this paper is to show how the new information technologies affect modelling of financial markets and decisions by using limited data resources within an intelligent system. By using intelligent information systems, mainly neural networks, this paper tries to show how the the limited economic data can be used for efficient economic decisions in the global financial markets.

 Advances in microprocessors and software technologies make it possible to enable the development of increasingly powerful systems at reasonable costs. The new technologies have created artificial systems, which imitate people's brain for efficient analysis of economic data. According to Hertz, Krogh and Palmer (1991), artificial neural networks which have a similar structure of the brain consist of nodes passing activation signals to each other. Within the nodes, if incoming activation signals from the others are combined some of the nodes will produce an activation signal modified by a connection weight between it and the node to which it is linked.

By using financial data from international foreign exchange markets, namely daily time series of EUR/USD parity, and by employing certain neural network algorithms, it has showed that new information technologies have advantages on efficient usage of limited economic data in modeling.

By investigating the "artificial" works on modeling of international financial markets, this paper is tried to show how limited information in the markets can be used for efficient economic decisions. By investigating certain neural networks algorithms, the paper displays how artificial neural networks have been used for efficient economic modeling and decisions in global F/X markets.

New information technologies have many advantages over statistics methods in terms of efficient data modeling. They are capable of analyzing complex patterns quickly and with a high degree of accuracy. Since, "artificial" information systems do not make any assumptions about the nature of the distribution of the data, they are not biased in their analysis.

By using different neural network algorithms, the economic data can be modeled in an efficient way. Especially if the markets are non-linear and complex, the intelligent systems are more powerful on explaining the market behavior in the chaotic environments.

With more advanced information technologies, in the future, it will be possible to model all the complexity of the economic life. New researches in the future need a more strong interaction between economics and computer science.

Introduction

Recent development of information technologies and telecommunications have given rise to an extraordinary increase in the data transactions in the financial markets. In large and transparent markets, with lower transactions and information costs, financial participants react more rapidly to changes in the profitability of their assets, and in their perception of the risks of the different financial instruments. In this respect, if the rapidity of reaction of financial players is the main feature of globalized markets, then only advanced information technologies, which uses data resources efficiently are capable of reflecting these complex nature of financial markets.

The aim of this paper is to show how the new information technologies affect modelling of financial markets and decisions by using limited data resources within an intelligent system. By using intelligent information systems, mainly neural networks, this paper tries to show how the the limited economic data can be used for efficient economic decisions in the global financial markets. For that aim, the daily EUR/USD parity end-day values from 01.01.2003 to 10.02.2006 will be predicted with its lags by using feedforward neural network architecture.

The paper is constructed as follows. In the first part, a literature review is presented to display the recent research results on predicting finacial time series by using new information technologies, mainly neural networks. The researes based on modeling EUR/USD parity are especially discussed. In the next part, data and methodology used in this paper are introduced. Feedforward neural network architecture and constructive algorithms are explained. In the empirical findings, certain test results such as MSE and R^2 are discussed in terms of efficient usage of limited data resources. In the concluding remarks, the findings are discussed for the efficiency of international financial markets, as well. The paper is concluded with suggestions for future research by highlighting alternative recent developments in new information technologies to model the financial markets.

Literature Review

Advances in microprocessors and software technologies make it possible to enable the development of increasingly powerful systems at reasonable costs. The new technologies have created artificial systems, which imitate people's brain for efficient analysis of economic data. According to Hertz, Krogh and Palmer (1991), artificial neural networks which have a similar structure of the brain consist of nodes passing activation signals to each other. Within the nodes, if incoming activation signals from the others are combined some of the nodes will produce an activation signal modified by a connection weight between it and the node to which it is linked.

Comparing with econometric models, modeling financial time series by neural networks have certain advantages. After training the network, the structure of the network provides a good prediction performance on unseen time series data. The network does not neither need to know how the data are interrelated with each other nor to make assumptions on the nature of the time series. For those reasons, the research made by neural networks does not know the certain assumptions about the statistical performance of data like normality, autocorrelation and heterosketasticity. As it was mentioned, the neural networks do not provide theoretical explanations for the models that they construct. However, the models are able to display non-linear relations among the data. By modeling exchange rates, displaying the nonlinear data within the time series is a remarkable task since the global exchange rate markets have deep participation among different countries and perceptions. In this respect, the

task of the neural networks is to train reliable data and experiment which combinations of data are resulting optimal results.

During the last decade, different nonlinear models have been tested in the literature to model exchange rates. Some studies, such as Chang and Osler (1999) have argued that exchange rates are unpredictable, in other words, a random walk model is better than nonlinear models in modeling the exhange rates. Gencay (1999) also examines the predictability of daily spot exchange rates using four models applied to five currencies, mainly, FRF, DEM, JPY, CHF and GBP against a common currency from 1973 to 1992. The models include random walk, GARCH(1,1), neural networks and nearest neighbours. He copmares the model in terms of their forecasting accuracy and concludes that non-parametric models outperform parametric ones, and mainly nearest neighbours dominate neural network models.

However, the researches using neural networks models display that the F/X markets are predictable as well though it has huge volume and investors have non-linear behaviours. For example, Zhang and Hu (1998) predicts the exchange rate by using nonlinear models depending on its past values, and the model outperformes simple linear models.

Yao, Poh and Jasic (1996) examine the predictability of the GBP, DEM, CHF, JPY and AUD against the USD, from 1984 to 1995 on weekly data and conclude that neural network models produce a higher returns than ARMA models. What is more important is for our paper is that they argue that without the use of extensive market data or knowledge, accurate forecasting can be made and significant profit can be achieved.

Carney and Cunningham (1996) predicts four exchange rates over the period 1979 to 1995 to by using the single-step and multi-step prediction of the weekly GBP/USD, daily GBP/USD, weekly DEM/SEK and daily GBP/DEM exchange rates. They show that neural network models are useful techniques that can make sense of complex data defining traditional analysis. By using daily and weekly data, Hu et al. (1999) also diplay that neural network models have more accurate results in modeling exchange rates than a random walk model.

Another important comon result of the researches on modeling exchnage rates with artificial neurl networks is that the models are able to predict short-term currency behaviour in general. Evans (1997) and Jamal and Sundar (1997) argue that neural network models have advantages if the short-term forecasts are required.

On the other hand, exchange rates are modeled with neural networks by employing fundamental data as well. For example, Plasmans, Verkooijen, and Daniels (1998) display that artificial neural networks are accurate models to detect non-linear patterns when using certin macroeconomic indicators as independent values in the exchange rate models. In fact, it may be more useful and efficient to model exchange rate markrets not only by using technical dat but also fundamental macroeconomic variables. However, since the aim of this paper is to show that "limited" data resources can be used to model globla markets with intelligent systems, employing macroeconomic variables in the model is out of concern.

After a short literature review and explaining motivation behind this paper, data and methodology used in this paper are introduced in the next part.

Data and Methodology

New information technologies have many advantages over econometric methods in terms of efficient data modeling. They are capable of analyzing complex patterns quickly and with a high degree of accuracy. Since, "artificial" information systems do not make any assumptions about the nature of the distribution of the data, they are not biased in their

analysis. In this paper, neural network architecture is used to model EUR/USD parity with technical data.

The selection of data is one of the most important starting point of neural network models. Since the motivation behind this paper is to show that limited data resources may be enogh to make efficient decisions in financial markets, daily end-day Bloomberg values of EUR/USD rates (as of at 24.^{00} every day) are used for European time from 01.01.2003 to 10.02.2006. In other words, the time series employed in the paper have 812 observations. The period is starting from 01.01.2003 since the paper aims to use limited data, in other words as much as less observations as possible. What is more, the beginning time of the data coincides the beginning of the new trend in the market since the FED has started to increase the short term interest rates of US treasury bill. The graph of the EUR/USD parity between selected period is presented below.

Graph 1: Daily Values of EUR/USD Parity Between 01.01.2003 and 10.02.2006
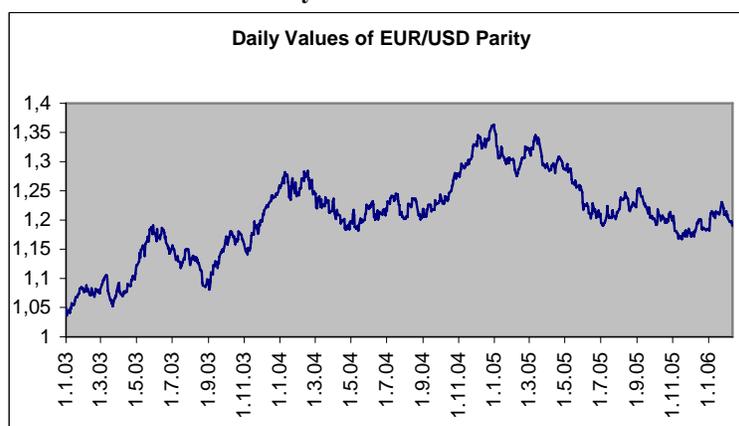
Since the aim is to use historical values of the parity to predict the future value, the paper uses different lag values of the EUR/USD exchange rates. Mainly, 1 day lag, 2 day lag, 3 day lag, 4 day lag and 5 day lag of the daily closing values.

Since the EUR/USD exchange market is the biggest financial markets in the world, it is not controlled by certain interest groups, in other words, it has a big volume and diversified participant groups. However, that does not mean that it is out of volatility concerns. Due to certian fundamental financial data, such as GDP, employment rates, inflation, international political instability, expectations and psychological reasons, the market has volatility. What is more, since the market participants have different perspectives in explaining the information come to the market, there is a collective power to follow the trend in the market. Although it is expected to be informationally efficient market due to deep volume and advanced structure, the EUR/USD market has been found predictable and therefore, non-efficient in many studies. The main reason for inefficiency in the EUR/USD market is that the participants follows and imitage each other by using technical indicators. The market as a whole moves according to the technical indicators and the fundamental data is only shape the direction in the long-run.

When predicting financial time series with neural networks, another important stage is to train a network which presents proper input patterns in order to minimize the error of the model and provide a high estimation performance. The weights should be adjusted to reach the computed output closer to the known output. Kecman (2001) states that this process should continue until the network provides the correct output for a given input. In the literature, the backpropagation training algorithm is suggested in creating neural networks for financial time series forecasting. The backpropagation algorithm compares the output of the processing elements of the output layer to desired outputs for the particular input patterns

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given. A measure of error is calculated as the squared difference between the actual and desired output. Since hidden layers do not have training target value, they should be trained according to the errors coming from previous layers. When the error terms are backpropagated through the nodes, the connection weights varies and the training occurs until the errors in the weights are enough small to reach an acceptable level.

There are three layers in design stage, mainly, an input layer, hidden layers and an output layer. The layer, into which data is transferred is called input layer; those where the nodes process the information passed to them by the input layer are labeled as hidden layers; and the layer where an output pattern, from a given input pattern processing through the preceding layers is called as output layer. At the input layer, the nodes receive the values of input variables and multiply them through the network, layer by layer. The number of hidden layers and nodes in each hidden layer can be selected arbitrarily, but too many nodes in the middle layer produce a neural network that merely memorizes the input data.

In this research, five models are created with technical/historical data. The models are presented below:

Model 1: $(EUR/USD)_t = a + b(EUR/USD)_{t-1}$
Model 2: $(EUR/USD)_t = a + b(EUR/USD)_{t-2}$
Model 3: $(EUR/USD)_t = a + b(EUR/USD)_{t-3}$
Model 4: $(EUR/USD)_t = a + b(EUR/USD)_{t-4}$
Model 5: $(EUR/USD)_t = a + b(EUR/USD)_{t-5}$

Each model has one input, one hidden and one output layer. Feedforward neural network architecture based on backpropagation algorithm is employed for the analysis. The important point in terms of modeling in this research is that, in the models, the lags are feed with the prior lags. In other words, for example in the Model 3, the independent variable, namely, $(EUR/USD)_{t-3}$ includes information coming from first and second lags, as well. The feedforward algorithm can be described as follows:

Figure 1 displays a one hidden layer feedforward network with inputs $x_1,...,x_n$ and output $\hat{y}$ as it is used in this paper. Each neuron performs a weighted summation of the inputs, and the inputs passes a nonlinear activation function σ. When the network is trained, its parameters are adjusted until the training data reaches the desired mapping, in other words, until $\hat{y}(\theta)$ matches the desired output y as closely as possible up to a maximum number of iterations[1].
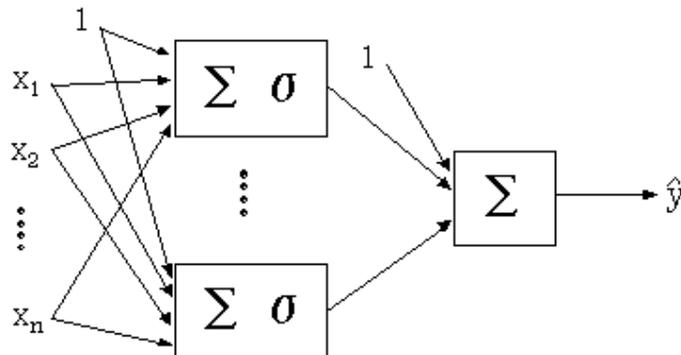
Figure 1. A feedforward network with one hidden layer and one output (www.wolfram.com)

"Forecaster" as an "artificial" intelligent technology is used in the analysis. "Forecaster" uses constructive algorithm to train network and select the topology. As a result, the program trains the data with feedforward network topology based on backpropagation. The program automatically ends the training and fixes the model when the MSE reaches a

minimum acceptable level. The empirical results of the analysis are presented and discussed in terms of efficiency of the global finnacial markets.

Empirical Findings

The data is trained by using random selection of daily closing values, and a 20 days short-term period is used for testing. Since the algorithm is designed as feedforward topology, when the model uses, for example, 2 lags as the output layer, it feed the first lag within the second lag as well. In other words, when the model test the 2 lags as the independend variable, the second lag is feed by the fitted values of forecasts in the first lag.

The model transacts the fitted values from first lag to the next. Therefore, the fifth lag includes information transforming from the first, second, third and fourth lags into the fifth lags. From that point of view, the model feed back the input layer and have advantages over econometric models.

As it can be seen on the Table 1, the importance level increases into 89,206 % as the lag of the variable reaches to fifth.

Table 1: Input Importance in ANNs(t-5) Model

	Importance(%)
t-1	0,704%
t-2	0,253%
t-3	8,414%
t-4	1,423%
t-5	89,206%

When the test results of the artificial neural network models are compared, it can be clearly differentiated that the ANN model using fifth lag of the variable, which includes the feedback values of the first four lags as well, has high importance in the model.

The test results displayed on the Table 2 support the fact that the ANN models have statistical capacity to predict the future values of EUR/USD parity. High R^2 values and accurate MSE values for training set encourage test the model for out of sample forecasting.

Table 2: Summary of ANNs Test Results

	ANNs(t-1)	ANNs(t-5)
Average MSE(Training Set)	0.00005919	0,0060377
Average MSE(Test Set)	0.00004981	0,0067923
Number of Good Forecast (Training Set)	673 (100%)	670 (100%)
Number of Good Forecast (Test Set)	138 (100%)	137 (100%)
R^{2*}	0,9882	0,9870
Correlation*	0,9941	0,9935

* Correlation and R^2 between actual and forecasted values

In-sample forecasting performance and errors of the Model 1 and Model 5 are showed on the Graph 2 and Graph 3, respectively.

Graph 2: In-Sample Forecasting Comparison of ANN Models
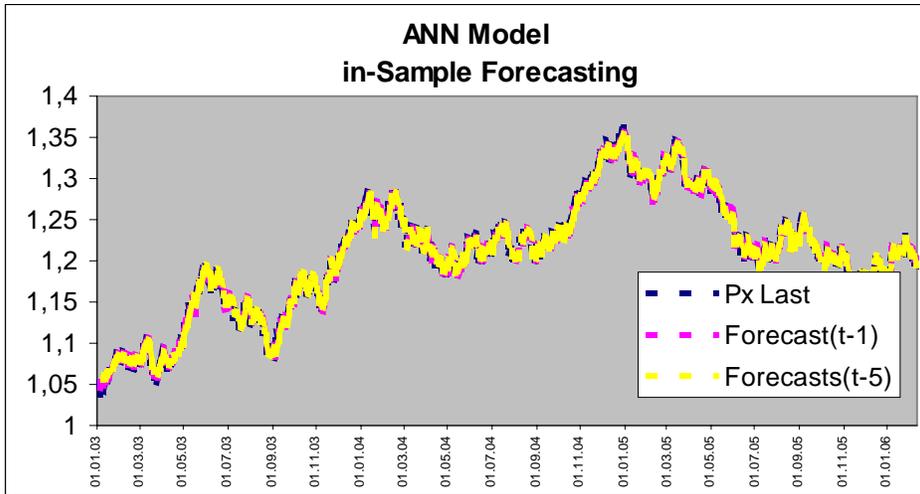
Graph 3: In-Sample Forecasting Errors Comparison of ANN Models
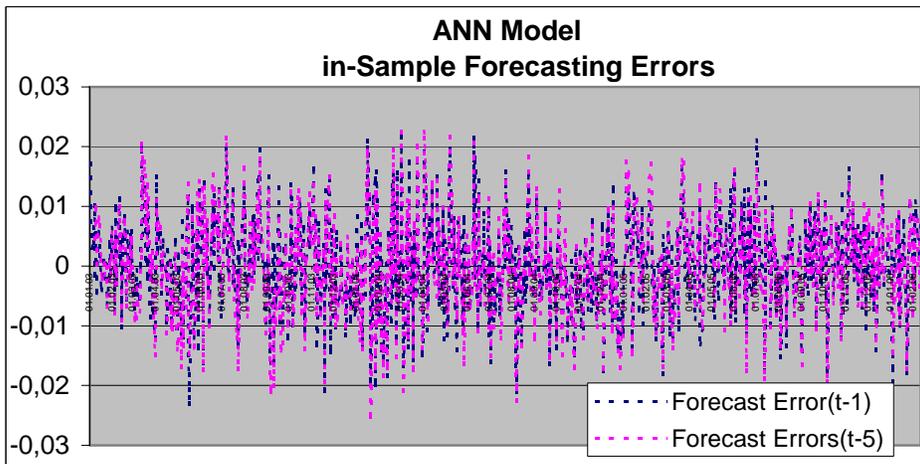
However, in order to compare the performance of the strategies, it is necessary to evaluate them on previously unseen data. By creating a out of sample with last 20 observations, the forecasting accuracy and trading performance of the models are compraed. A short period is selected since as explained in the literature review, the ANN models in predicting exchange rates are valid in short terms according to the past researches.

As it is known statistical performance measures are often inappropriate for financial markets. Modelling techniques are optimised using a mathematical criterion, but ultimately the results are analysed on a financial criterion upon which it is not optimised. By creating an out of sample, the trading sucsess of the model is performed.

The results of the estimation and the errors are showed on the Graph 4 and Graph 5, respectively.

Graph 4: Out-of-Sample Forecasting Comparison of ANN Models
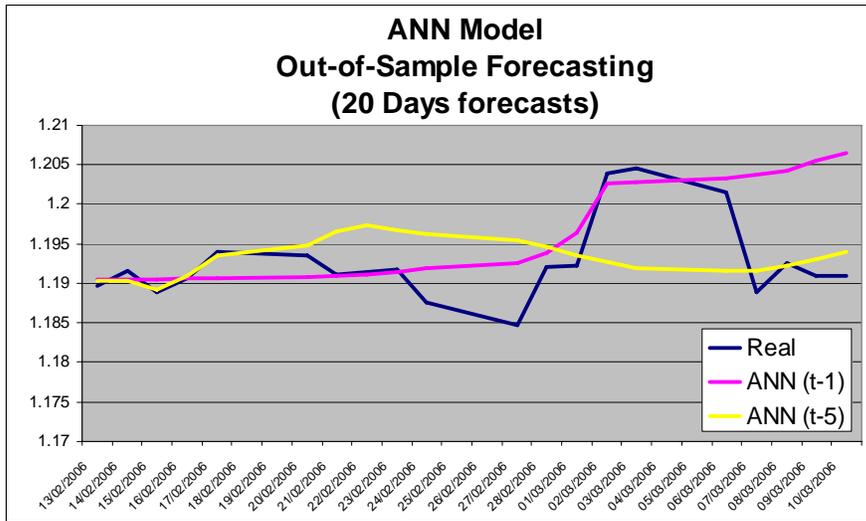
Graph 5: Out-of-Sample Forecasting Errors Comparison of ANN Models
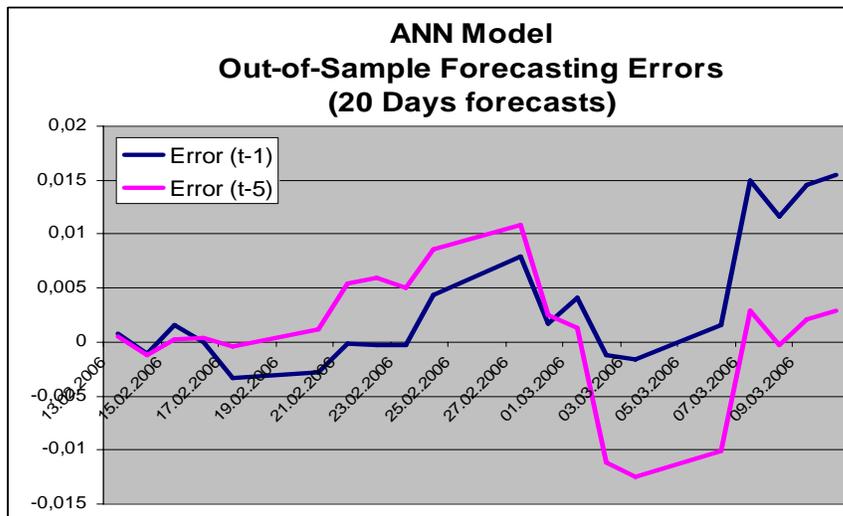
As it can be followed from the graphs, the models have good performance in two week periods. The Model 1 is able to predict with tolerable error until the 16th day value of the EUR/USD parity. On the other hand, although the Model 5 does not see the volatility in the very short-term, it can be used to predict the exchange rate market behaviour for two weeks period. Another important result of the analysis is that unless there is a shock in the market, the models perform well with the long-term memory. However, in case of shock, it is not clearly known how the model react since "the memory" of the model does not include a shock.

For the theory of finance, on the other hand, the analysis displays that it is possible to earn money with historical data in the global exchange rate markets, which means that the market is not efficient.

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Suggestions for Future Research

By using financial data from international foreign exchange markets, namely daily time series of EUR/USD parity, and by employing feedfprward neural network topology, it has showed that using new information technologies and models have advantages on efficient usage of limited financial data in modeling.

By investigating the "artificial" works on modeling of international financial markets, this paper is tried to show how limited information in the markets can be used for efficient economic decisions. By using different neural network models, the limited economic data can be modeled in an efficient way. Especially if the markets are non-linear and complex, the intelligent systems are more powerful on explaining the market behavior in the chaotic environments. The neural networks have the ability to detect non-linearity in the financial time series where it is not easy to provide reasons since taking everything into account is just not possible.

By predicting EUR/USD parity in two weeks period, it has showed that the artificial neural network models have forecasting ability in the global F/X market in which taking everything into account is not possible due to complexity and widespread market participants in the market. For practice, the analysis has showed that technical analysis in the global F/X market is valuable in making profit. In terms of finance theory, on the other hand, it has displayed that the global F/X market is not efficient.

When focusing on the issue of importance of new information technologies in modeling complex financial markets, it is excepted that with more advanced information technologies, in the future, it will be possible to model all the complexity of the economic life. The artificial neural networks are still black boxes for the financial modeling and only their little capacities have been used by the researchers and traders. New researches in the future need a more strong interaction between finance, economics and computer science.

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Monetary Neutrality, Home Mortgages, and the Phillips Curve

Alan Day Haight
University of New York, Cortland

Standard mortgage borrowing practices are incorporated into a model of the loanable funds market. Contrary to the Taylor rule (which is for short-term rates), in this model an increase in inflation causes the long-term nominal rate to rise by a smaller amount, leaving the real rate lower. In turn, the lower long-term real interest rate stimulates investment, growth, and employment. As in the recent literature on the New Keynesian Phillips Curve, the long-run Phillips curve produced by this model is not vertical, and money is not neutral. Higher inflation reduces unemployment in the long run, even when inflationary expectations *are* fulfilled. The cause of this violation of the classical dichotomy is bounded rationality: to simplify a complex decision regarding how much to borrow, home buyers erroneously focus on their payment-to-income ratio, which is a function of the nominal interest rate, not the real interest rate. Central-Bank success at fighting inflation diverts loanable funds for productive investment into housing and other consumer durables.

Monetary Neutrality, Home Mortgages, and the Phillips Curve

In classical models of the demand for loanable funds, it is assumed that rational agents base their behavior on the real interest rate. As a *pre*scription this is good advice, but as a *de*scription of what household borrowers actually do, it simply is not realistic. When considering the purchase of a home (or car, or washing machine, or credit card purchase) most people ask not about the debt but about the payment; i.e., they inquire whether the monthly payment would be reasonably affordable relative to their income. Real estate brokers, mortgage brokers, and other sales people usually encourage buyers to evaluate a potential purchase this way, thereby shifting the buyer's attention from the debt (which may be intimidating) to the payment (which may seem affordable).[1] This monthly payment depends on the nominal interest rate, not the real rate.

One would think that such a widespread borrowing practice would play a central role in models of the market for loanable funds. Yet it is assumed (in classical models) that borrowers watch the *real* interest rate.[2] To address that omission, this paper develops a model that allows for the actual practice of judging a loan's affordability by looking at the prospective payment relative to income. That modification leads to results that violate the classical dichotomy and the neutrality of money. Changes in inflation lead to only partially offsetting changes in the nominal rate, so the real rate moves opposite to inflation. Higher inflation lowers the real interest rate in the long run, thereby stimulating investment, growth, and employment. That is, higher inflation reduces unemployment, even in the long run when inflationary expectations are fulfilled. This restores the original, long-run policy interpretation of the Phillips curve, contrary to the well-known Friedman (1968) and Phelps (1967) expectations literature that generally discredited the original Phillips Curve. More recently a literature on the New Keynesian Phillips Curve has revived the original idea of a policy-relevant tradeoff between inflation and unemployment (Gali, et. al., 2005). The reason for the tradeoff suggested in this paper is that mortgage borrowers are *not* perfectly rational: they rely on a somewhat misleading heuristic piece of information (the payment-to-income ratio) rather than focusing rationally on the real interest rate.

Modeling the Effect of Inflation on the Real Interest Rate

Consider a household that is contemplating whether it can afford the purchase of a home, car, kitchen appliance, or other consumer durable good. The method of financing will be a mortgage, installment loan, or credit card debt. The household must ask how much home (or car, etc.) is reasonably affordable? Real estate brokers, mortgage loan brokers, and other sales people typically assure prospective buyers that the contemplated debt is affordable if the payment-to-income ratio (PTI) will be reasonable. Based on many decades of experience[3], there is a consensus that a reasonable maximum for the PTI ratio (combining mortgage payments, car loans, and installment loans) is 36 to 39 percent of pre-tax income.[4]

1Using the payment-to-income ratio as a guide to debt affordability can seriously mislead the borrower when inflation slows, for the borrower is tempted to take on an unwarranted increase in her debt stock burden. Warnings regarding the resulting debt trap (Haight 2003; Pulliam, 2004) are routinely overlooked by consumers.
2The (rather Panglossian) reasoning behind this modeling practice seems to be that an irrational or sub-optimal rule-of-thumb for borrowing behavior should not exist, ergo it does not exist. Yet a growing literature on heurisitcs indicates that such rules of thumb do in fact thrive in a setting of bounded rationality.
3Unfortunately, some of those many decades represented experience with relatively high inflation, so that experience can be misleading today. See Haight (2003).
4 This range for the payment-to-income ratio is not writ in stone: larger PTIs are considered acceptable for higher-income households, or in markets where home prices are rising very rapidly. Still, the PTI ratio rarely goes above 45 or 50 percent.

Following standard practice, then, suppose the household takes out a loan to buy its house and other consumer durables. Let r represent the nominal interest rate, while R is the real interest rate. To simplify calculations, assume the household is infinitely-lived, so it can make interest-only payments. Then the mortgaged amount (m) is related to the household's income (y) by the equation

$$mr = PTI_{max}\, y \qquad (1)$$

where PTI_{max} is the maximum allowable payment-to-income ratio. Rearranging,

$$m = \frac{PTI_{max}}{i} y$$
$$\qquad (2)$$

π For example, if the nominal interest rate is .09 and the maximum acceptable payment-to-income ratio is .36, then the (infinitely lived) household will be willing to take on a mortgage that is about for four times its income. Let π represent the inflation rate. Then we know from the Fisher equation that

$$r = R + \pi \qquad (3)$$

Combining (2) and (3) gives

$$m = \frac{PTI_{max}}{r + \pi} y \qquad (4)$$

Let N represent the number of households in the country. Aggregate household income is $Y = Ny$, and the aggregate demand for mortgage funds is M=Nm. Multiplying (4) by N converts it to the aggregate relationship:

$$M(r;\pi) = \frac{PTI_{m\varepsilon}}{r + \pi} \qquad (5)$$

Clearly, the aggregate demand for mortgage funds is a decreasing function of both the real interest rate and the inflation rate:

$$\frac{\partial M}{\partial R} = \frac{\partial M}{\partial \pi} = -\frac{PTI_{max}}{(R + \pi)^2} Y < 0 \qquad (6)$$

This is the source of the upcoming violation of the classical neutrality: the country's demand for loanable funds (which will influence the *real* interest rate) is partly a function of a nominal variable, the inflation rate.

Let I(R) represent firms' aggregate investment demand for loanable funds. Firms are managed by rational agents who (unlike home buyers) watch the *real* interest rate:

$$\frac{dI}{dR} < 0 \qquad (7)$$

Using (6) and (7), the market for loanable funds can be written

$$I(R) + M(R, \pi) = \overline{S} \qquad (8)$$

To simplify, aggregate saving (S) is treated as fixed. Now consider the effect of a fall in the inflation rate. Totally differentiating (8), assuming dS=0, and rearranging gives

$$\frac{dR}{d\pi} = \frac{-\dfrac{\partial M}{\partial \pi}}{\dfrac{\partial I}{\partial R} + \dfrac{\partial M}{\partial R}} \qquad (9)$$

Recalling (6), clearly the numerator of (9) is positive. Using (6) and (7), the denominator of (9) is negative. Hence the sign of inflation's effect upon the real interest rate in (9) is negative:

$$\frac{dR}{d\pi} < 0 \qquad (10)$$

From (6) we know that a rise in the real rate R and a rise in inflation have the same effect on mortgage demand M, so (10) can be rewritten as

$$\frac{dR}{d\pi} = -\frac{\dfrac{\partial M}{\partial \pi}}{\dfrac{\partial I}{\partial R} + \dfrac{\partial M}{\partial \pi}} > -1 \qquad (11)$$

Combining (9), (10), and (11):

$$-1 < \frac{dR}{d\pi} < 0 \qquad (12)$$

Taking the derivative of (3) with respect to the inflation rate,

$$\frac{dr}{d\pi} = \frac{dR}{d\pi} + 1 \qquad (13)$$

which is positive because (12) shows that

Hence $\qquad\qquad\qquad\qquad\qquad \dfrac{dR}{d\pi} > -1$

$$0 < \frac{dr}{d\pi} < 1$$

$$\qquad (14)$$

Combining (7) and (12),

$$\frac{dI}{d\pi} > 0 \qquad (15)$$

Back to the Original Phillips Tradeoff

As is well known, an increase in inflation increases the nominal interest rate. The question is, how much? Equation 14 indicates that in the context of this model, the nominal rate "under-reacts" to changes in inflation; the inflation-induced rise in the nominal rate is not sufficient to prevent a fall in the real rate. An increase in the steady, long-run, fully anticipated rate of inflation raises the nominal rate by a smaller amount. That rise (like any rise) in the nominal rate will raise mortgage payments and discourage myopic mortgage borrowers. The funds thereby released from buying homes and other consumer durables are then available to be used for more productive investments. Evidently a little inflation can be good for productive investment (15). The resulting improvement in long-run productivity and competitiveness can reduce unemployment. Higher inflation can increase investment, which improves productivity and competitiveness, leading to increased employment.

Summary

This paper supports the original interpretation of the Phillips curve: higher inflation lowers unemployment, even in the long run when inflationary expectations are fulfilled. The focus is on a setting where the inflation rate is steady and correctly anticipated. The suggested policy tradeoff does *not* require that agents have mistaken expectations about the inflation rate, and therefore it is *not* confined to the short run.[5]

On this ground, where there are no inflation surprises, the classical dichotomy and monetary neutrality are often considered impregnable. Indeed, Keynesians have often ceded this long-run, perfect foresight territory to the classical viewpoint. Yet it may be that in the long run we are all ... still looking at a sloping Phillips curve.

Basically, I advocate a "crowding out" type of argument, but in this case the villain is housing expenditure, not government expenditure. Housing expenditure (which is driven by myopic mortgage borrowing) crowds out investment. Low, steady, predictable inflation is often considered very desirable, but it has a drawback: it stimulates housing expenditure, which then crowds out productive private investment.

This may be the case in the USA, where former chairman Alan Greenspan's long tenure and successful vigilance against inflation have coincided with a long expansion of home construction activity. Without that home construction expansion, US productivity and employment would have been higher.

5It does require, however, that agents be somewhat myopic in another (more common and enduring) way; viz., they must trust the payment-to-income ratio as their guide to borrowing. Of course, in the very long run, borrowing customs might change.

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Oil Consumption and GNP Relationship In Turkey: An Empirical Study

Erdal Karagöl
Balıkesir University Bandırma

Erman Erbaykal
Balıkesir University Bandırma

H.Murat Ertuğrul
Balıkesir University Bandırma

This paper will investigate the causal relationship between oil consumption and GNP. For this purpose, we will investigate the presence of cointegration among the variables and use a vector error correction model to test causality relationship. Empirical results for Turkey over the period 1971–2003 suggest that there is cointegration relationship between GNP and oil consumption. We found no causal relationship between oil consumption and GNP in short run whereas there is a long run unidirectional causality running from GNP to oil consumption.

Introduction

Until the oil crises in 1970's the role of energy in economic growth was ignored. Economic growth theories till the oil crises(Cobb-Douglas type) focused on labor and capital in production function; energy, technology and other factors is assumed exogenously. After oil crises, energy is assumed as a production factor and added the production function. Development in applied econometrics caused to reveal huge literature about energy consumption and GDP or economic growth. Although the relationship between energy consumption and output has been investigated over the past three decades, the empirical evidences are still ambiguous.

The pioneering study of Kraft and Kraft (1978) investigated the causality relationship for USA and found unidirectional causality from GNP to energy consumption for the period 1947-1974. However, Akarca and Long (1980) found no causality using the same data, but for the period 1947-1972. Stern (2000) investigated Granger causality between energy and GDP in a multivariate model with energy, GDP, capital and labor for the USA in the post-war period. He found no granger causality between energy consumption and GDP but after changing fuel composition he found univariate granger causality running from GDP to energy consumption.

Energy consumption not only investigated aggregately but also disaggregately. For example, Altinay and Karagol (2005) investigated electricity consumption and GDP relationship for the period between 1950 and 2000 in Turkey. They found unidirectional causality running from electricity consumption to GDP. However, Mozumder and Marathe (2006) investigated same relationship for Bangladesh and found unidirectional causality running from GDP to electricity consumption for the period of 1971-1999. In the literature, there is not enough study which investigates oil consumption and GNP interaction except Zou and Chau (2005).

Zou and Chau (2005) found no cointegration between oil consumption and GDP, in China for the period of 1953-2002. Due to liberalization of China's economy in 1984; they separate these period into 1953-1984 and 1985-2002. They found cointegration relationship between oil consumption and GDP. In 1953-1984 period, they found no causality between oil comsumption and GDP in the short run, conversely, they found bidirectional causality in the long run. In 1985-2002 period; in short run they found unidirectional causality from oil consumption to GDP, however, in long run there is bidirectional causality as 1953-1984 period.

Due to the lack of studies about this topic, we try to investigate oil consumption and GNP relationship for Turkey. Like other developing countries, Turkey also faces an increasing oil demand. For example, between 1971 and 2003 the average growth rate of total oil consumption has increased by % 4.1, whereas the real GNP has grown about % 3.8 per annum.

This paper tries to investigate the relationship between oil consumption and GNP for Turkey 1971-2003 period due to the lack of study for Turkey about. The paper proceeds as follows. Section 2 deals with methodological issues and data used in this empirical analysis. The empirical evidences are presented in Section 3. Finally, the conclusions of the analysis and policy implication are given in Section 4.

Variables and Data Sources

The study uses the annual time series of real GNP (Y hereafter) and oil consumption (P hereafter), for Turkey from 1971 to 2003, with two variables measured in natural logarithms. The real GNP series in 1987 constant billion Turkish Liras (the local currency)

were obtained from State Planning Organization, *Economic and Social Indicators: 1950-2003.* Oil consumption is measured as thousand barrels per days and the data are obtained from International Energy Agency Statistics(2005). Two variables are transformed to natural logs denoted as LY, and LP.

Emprical Results
Unit Roots Tests

We use the ADF(1979) and PP(1988) test for the existence of unit roots and identify the order of integration for each variable.The results of the ADF and PP tests for stationarity properties of the variables are presented in Table 1.

Table 1. Results of the ADF and PP unit roots tests

*denotes %1 significance level
**denotes %5 significance level
***denotes %10 significance level

Variable	Augmented Dicky- (ADF) Fuller test		Philips-Perron test (PP test)	
	Level form	First Differences	Level Form	First differences
LY	-2.483	-6.576*	-2.588	-6.576*
LP	-2.960	-5.308*	-2.981	-5.308*
Significant level	Critical values			
1%	-4.273	-3.661	-4.273	-3.661
5%	-3.557	-2.960	-3.557	-2.960
10%	-3.212	-2.619	-3.212	-2.619

The Table 1 shows that the calculated t statistics for two variables (LY and LP) are less than the critical values at, respectively, 1%, 5% and 10% levels for both ADF and PP tests. Thus, the results show that the null unit roots hypothesis cannot be rejected, suggesting that two variables are nonstationary in their level forms. The results of the first differenced variables show that the ADF and PP test statistics for two variables are greater than critical values at 1%, 5%, 10% levels and the two variables are staionary after differenced, suggesting that two variables are integrated of order I(1).

Cointegration Tests

The full information maximum likelihood procedure of Johansen (1988) and Johansen and Juselius (1990) performs better than others according to several criteria, we use the maximum likelihood estimation method of Johansen and Juselius (1990) to test for cointegration.

Consider a VAR and the corresponding VECM:

$$X_t = c + x_1 X_{t-1} + x_2 X_{t-2} + \ldots\ldots x_p X_{t-p} + +\varepsilon_t \qquad (1)$$

Where X = GNP (Y), oil consumption (EC). Moreover, c is a constant term (3x1 in our case), $\pi = nxn$ matrices of autoregressive coefficients for i = 1, 2…p, To distinguish

between stationarity by linear combinations and differencing, a reparametrisation of equation (1) is needed. Thus the system is equation (1) can be rewritten equivalently as:

$$\Delta X_t = c + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots \ldots \Gamma_{p-1} \Delta X_{t-p+1} + \Pi X_{t-p} + \varepsilon \qquad (2)$$

$$\text{Where} \quad \Gamma_i = -(I - \pi_1 - \ldots \pi_i) \ (i = 1 \ldots, p\text{-}1) \quad \text{and } \Pi = -(I - \pi_1 - \ldots - \pi_p) \qquad (3)$$

By examining the Π matrix, we can detect the existence of cointegrating relations among the X variables. The most interesting case is that if rank (Π) = r < n, then there are matrices β' and α of dimension nxr such that $H_0: \Pi = \alpha \beta'$ and there are r cointegrating relations among the elements of βX_t is interpreted as a matrix of cointegration vectors and provides the property that elements in β'X_t are stationary even though X_t is non-stationary.

The second step indicates to test the cointegration using the Johansen maximum likelihood approach Johansen (1988) and Johansen and Juselius (1990) if there is cointegration the either unidirectional or bi-directional Granger causality must exist, at least in the I (0) variables. Engle and Granger (1987) Table 2 indicates the results of cointegration using Johansen maximum likelihood approach employing both maximum eigenvalue and trace statistic for VAR=1. We report the results of cointegration analysis obtained by the estimation (a) with the lag length k=1. The maximal eigenvalue (λ max) and trace eigenvalue (λ trace) statistics reject the null of no cointegration (r=0) but not the null of at most one cointegrating vector (r=1) so there appears to be a single cointegrating vector for the system. Table 2 gives the cointegration analysis, where Max and Trace denote the associated maximum eigenvalues and trace statistics respectively.

Table 2. Johansen and Juselius Cointegration Test

Cointegration Rank	Trace Statistics			Max Statistics		
		5 %	1%		5%	1%
r=0	17.255**	15.41	20.04	16.844**	14.07	18.63
r≤1	0.410	3.76	6.65	0.410	3.76	6.65
Normalized cointegration equation : LY=1.069LP						

*Denotes for 1% significance level. ** Denotes for 5% significance level.

The results of the cointegration tests are reported in Table 2. The results indicate that there is one cointegration vector because the trace test rejects both the null hypothesis of zero cointegration rank and the null of at most one cointegration rank with no linear trend, but it does not reject the null of at most one cointegration rank with a linear trend. The eigenvectors presented in Table 2 are normalised by LY.

An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. A shock to the i th variable directly affects the i th variable, and is also transmitted to all of the endogenous variables though the dynamic structure of the VAR.

Figure 1. Impulse response functions a one standart deviation shock in LP

Response of LY to LP
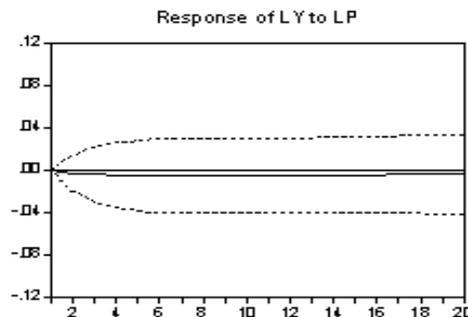
The results of the impulse- response functions, which showed the effects of one standart deviation shocks to the innovations in current and futures values of endogenous variables, are investigated for the 30 step ahead years in Figure (1)

In Figure1, shows that the effects of one standart deviation shock given to the oil consumption(LP) on the GNP (LY). It is clear from figure above that there is not significant effects oil consumption shock on GNP.

Figure 2. Impulse response functions: a one standart deviation shock in LY

Response of LP to LY
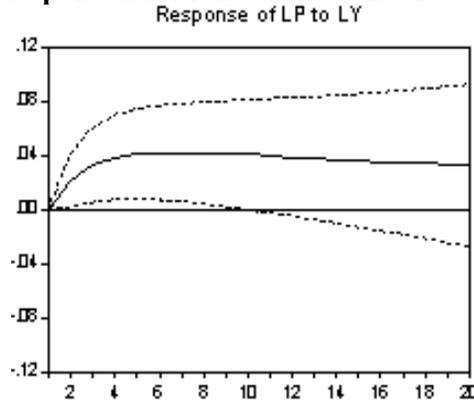
In Figure 2 , shows that the effects of one standart deviation shock given to the GNP (LY) on oil consumption(LP). We can say that when one standart deviation shock is given to the LY, this shock did not affect on LP first year however from the second year this shock positively affect LP and the effect of the shock is permenant.

Granger Causality Tests

If the variables are cointegrated, a VECM should be estimated rather than a VAR as in a standard Granger causality test Granger (1988). Therefore, we estimate a VECM for the Granger causality test because we found a cointegration relationship between oil consumption and GNP.

$$\Delta LY = \alpha_1 + \sum_{i=1}^{n} \delta_{y\,i} \ \Delta LP_{t-i} + \sum_{i=1}^{n} \sigma_{\ yi} \Delta LY_{t-i} + \theta_1 \ ECT_{t-i} + \varepsilon_{yt} \tag{4}$$

$$\Delta LP = \alpha_2 + \sum_{i=1}^{n} \Omega_{z\,i} \ \Delta LY_{t-i} + \sum_{i=1}^{n} \phi_{\ zi} \Delta LP_{t-i} + \theta_2 \ ECT_{t-i} + \varepsilon_{yt} \tag{5}$$

Where LP and LY oil consumption and GNP respectively. As we showed the series to be cointegrated, there must be either unidirectional or bidirectional Granger causality, since at least one of the error correction terms (ECT) is significantly nonzero by the definition of cointegration. First, by testing for all δyi equals 0 in equation (4) or for all Ωzi equals 0 in equation (5), we evaluate Granger weak causality. This can be implemented using a standard Wald test. Masih and Masih (1996) and Asafu-Adjaye (2000) interpreted the weak Granger causality as 'short run' causality in the sense that the dependent variable responds only to short-term shocks to the stochastic environment.

The other possible causality is added the ECT in equation (4) and (5). The coefficients on the ECT represent how fast deviations from the long run equilibrium are eliminated following changes in each variable. In order to test Granger causality, we will investigate whether the two sources of causation are jointly significant. This can be done by testing the joint hypotheses that all δyi and θ_1(ECT) are jointly zero in equation (4) or all Ωzi and θ_2(ECT) are   jointly zero (0) in equation (5). This is referred to as a strong Granger causality

test. The joint test indicates which variable(s) bear the burden of short run adjustment to re-establish long run equilibrium, following a shock to the system Asafu-Adjaye (2000).

Table 3. Granger Causality Tests

Dependent Variable	Source of Causation (Independent Variable)				
	Short Run-Causality		Long Run-Causality		
	ΔLY	ΔLP	ECT	ECT/ ΔLY	ECT / ΔLP
ΔLY		0.634	0.001	------	0.337
ΔLP	2.623	------	7.778**	4.235**	------

The appropriate lag lengths are chosen using Akaike's Information Criteria (AIC).
 * Denotes for 5% significance level.
 ** Denotes for 1% significance level.

Table 3 shows the result of a Granger causality test between oil consumption and GNP. As we find the coefficients on lagged oil consumption in the LY equation are not significant 1% and %5 level, while those on lagged GNP in the LP equation are not significant, we conclude that there is no short run causal relationship between oil consumption and GNP as Zou and Chau (2005) for China 1953-1984 periods. We cannot reject the null hypotheses that the coefficients on the ECTs and the interaction terms are jointly zero in LY equation while we can reject the null hypotheses that the coefficient on the ECT and the interaction terms are jointly zero in the LP equation. The coefficients of the ECTs in the LP equation are significant at the 1% level. So we found unidirectional long- run causality between oil consumption and GNP from GNP to oil consumption using Wald test whereas Zou and Chau (2005) found bidirectional long run causality for China 1953-1984 and 1985-2002 period.

Summary and Conclusion

This paper examined the causal relationship between oil consumption and GNP for Turkey over the period 1971–2003 using a bivariate model of GNP and oil consumption. To test Granger causality, we employed a VECM instead of a VAR model because we found strong evidence that the variables are cointegrated and we wanted to study the short run relationship as well as the long run dynamics. The empirical results suggest that there is a unidirectional causal relationship between oil consumption and GNP from GNP to oil consumption in long run, and short run there is no causality between GNP and oilconsumption. The source of causation in the long run points to the ECT in both directions. We can infer that oil conservation policy do not harm economic growth in Turkey. So that the polices which try to protect environment by reducing oil consumption can be supported by the government. Finally, we can say that oil consumption continou growing as long as economy grows in Turkey .

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Reflections of the New Economy on the Monetary Policy and Central Banking

Haydar Akyazi
Karadeniz Technical University

Seyfettin Artan
Karadeniz Technical University

Developments in the knowledge and communication technologies have been causing significant changes on the working mechanisms of the economy both at the national and international areas. Some of the developments can be indicated as follows: the dramatic increasing of capital movements amongst nations; the speeding of global economic integration; the effects of world's financial markets; the creation of new payment mechanisms; the decreasing of transaction and knowledge costs; getting the information in a permanent and fast way; the fluctuations in financial markets; increasing potential growth and productivity rates. It is possible to summarize the mentioned developments with the concept of "new economy" and also the effects of new economy within two main categories like microeconomic and macroeconomic effects.

In this paper, monetary policies of new economy and its reflections on central banking are examined with regard to the macroeconomic effects of the new economy. In fact, it can not be said that the works carried out, in this area, in the economics literature has a long history. However, it should also be indicated that, as with other subjects of economics, an accepted common view on which direction the new economy will affect monetary policies and central banking has not been created. The views based on studies can be divided into two main groups: The first one is the group of economists who support the idea that the new economy does not constitute any changes relating to monetary policies and central banking. The second one is the group of economists who argue that the new economy can cause vital changes on monetary policies and central banking.

This paper, first of all deals with the results of studies which explore the potential reflections of the new economy on monetary policies and central banking. In addition, the evaluation concerning the future of the monetary policies being implemented in Turkey is also provided in light of the studies carried out in this context.

Introduction

The globalization and developments in the information and communication technologies in the last quarter of the 20th century have given birth to important changes in the commercial, educational, health, economic, social, political and cultural lives of the societies. Likewise, some researches suggest that the developments in the information and communication technologies boost productivity, offer new employment scope, increase potential growth ratio without raising inflation, affect living standards positively, change traditional commerce and payment types, promote democracy, facilitate state-citizen relations, increase health service quality and convert goods, labor and money markets into more competitive forms. In spite of these positive developments, there are some negativity like digital division and instability.

Various concepts such as "e-economy", "new economy", "e-commerce", "e-financing", "e-money", "e-banking", "e-education", "e-health", "e-government", "e-democracy" and "e-citizenship" are seen to have used to describe the developments to which the information and communication sectors lead. The multitude and diversity of the concepts can be taken as a sign how much the innovation in the information and communication technologies affects many aspects of everyday life.

In this paper, the macroeconomic reflections of the new economy on monetary policy and central banking are examined. In fact, it is hard to say that the works carried out in the economics literature have a long history. However, it should also be indicated that a consensus at which direction the new economy will affect monetary policy and central banking as well the other subjects of economics has not been created. The economists in this case can be divided into two main groups: The first one is the group of economists who support the idea that the new economy does not constitute any changes relating to monetary policy and central banking. The second one is those who argue that the new economy can cause vital changes on monetary policy and central banking.

This study has been organized as follows: we have examined the conceptual issues concerning new economy in the second section, the advent of the new economy and its basic features in the third section, and the macroeconomic reflections of new economy on monetary policy and central banking in the fourth and fifth sections.

The Definition of New Economy and Conceptual Issues

In the literature, it is apparent that there is no consensus on how to express the impacts of the developments in the information and communication technologies on economy and the extent of their impacts. And this is accompanied with some problems. The first problem is connected with the *concepts* used to express the impacts of information and communication technologies on economy. However, when the literature is scrutinized, the multitude of the frequently referred words such as "digital economy", "digital era", "digital sector", "information economy", "e-commercial", "e-economy", "e-conomy", "electronic commerce", "knowledge-based economy", "knowledge economy", "weightless economy", "virtual economy", "internet economy", "new global economy", "network economy", "frictionless commerce", "innovation economy", "connected economy", "next economy", "new new economy", "renewed economy", and "new old economy" summarize what is meant by the problem.

The second problem is related to the *definition* of the concepts to have been used for analyzing the changes emerged in economy. This problem results from the various perspectives that have been formed on the issue of the *dimension* or *depth* of the change. It is meant by the dimension of the impact what are the elements that have caused the changes in economy, whether the impacts of the technological changes on economy are observed in a

certain sector or in all sectors, whether or not they are observed in certain countries or throughout the world and whether structural changes have been experienced in economy. Definitions are given in narrow or broad sense according to the dimension of the specified impacts.

These two problems are also encountered in the context of the concept "new economy", which is the subject of this study. Likewise, even though a quite large literature of new economy exists, it is pretty hard to respond correctly to the query what the *new economy is* at this stage. Consequently, it is rather a difficult task to try to define new economy.

The usage of the concepts and definitions covering lots of different meanings, paves the way to misinterpretation and misguidance. Thus, when selecting and defining concepts, it must be cautious about the fact that they hold different and similar contents. In the reduction of these specified problems, it will be helpful to express clearly the contents of the concepts and definitions to be used in the studies. For example, Cohen, Delong and Zysman (2000) stated that they preferred to apply a new term named "E-conomy". In their opinion, the term "network economy" is of very narrow meaning; on the other hand, "new economy" very broad. Kling and Lamb (2000) suggest that using the term "digital economy" to include the goods and services whose development, production, sale, or provision is critically dependent upon digital technologies, and the term "information economy" to include all informational goods and services like publishing, entertainment, research, insurance services, and teaching in all of its forms.

The proposals below should be taken into consideration in analyzing the impacts of the changes in the information and communication technologies on economy:

- If the internet is considered to be a stimulating power of new economy, such concepts as "digital economy", "network economy", "e-economy" or "internet economy", can be applied in the same sense. These definitions are in narrow sense.

- If new economy is not considered to be restricted with the digital or internet economy, in this case the new economy can be defined in a sense that will cover digital economy, globalization, innovation and sustainable development (http://www.crie.ro/nouaeconomie/se1-presentation-VD.html). The definitions given in this scope are considered to be broad meaning.

In many studies, it is seen that new economy concept covers the basic features of internet economy and information economy. In this context, the term "new economy" describes an economy where both final output and intermediate goods predominantly consist of information and where the digital information and communication technologies provide world-wide access to almost any available information (Piazolo, 2001, p.3).

In the light of conceptual discussions which are tried to be summarized above, it is beneficial to mention some definitions related to new economy.

While Stiroh (2002) defines new economy as productivity gains, unemployment declines, and inflation moderation in the late 1990s that resulted from technology, globalization, and increased competitive pressures, Bullard and Schaling (2000) label the new economy as a condition in which productivity and growth increase are experienced on the one hand and inflation follows a stagnant line on the other. It is accepted that the basic factor lying under the growth without enhancing inflation is the higher performance provided in productivity.

According to Nordhaus (2000), the new economy involves acquisition, processing and transformation, and distribution of information. The three major components are the hardware (computers) that processes the information, the communications systems that acquire and distribute the information, and the software which with human help manage the entire process.

Nakamura (2000) expresses the new economy as high-tech innovation and he thinks that the globalization of world markets have changed our economy enough that we need to think about it and operate within it differently.

To Atkinson and Court (1998), the term new economy, refers to a set of qualitative and quantitative changes that, in the last 15 years, have transformed the structure, functioning, and rules[1] of the economy.

Gordon (2000) defines the new economy as mid-1990s acceleration in the rate of price decline in computer hardware, software, and telephone services, the corollary of an acceleration of the exponential growth rate of computer power and telecommunication capability, and the wildfire speed of development of the internet.

Some of the definitions limited with a few examples related to the new economy have been made in a narrow sense and the others in a broad sense. While Atkinson and Court (1998), Stiroh (2002) and Nakamura (2000) prefer to make a broad definition, Nordhaus (2000) and Gordon (2000) are interested in narrow one.

Two final points to be made here are that there are another division concerning the definitions of new economy as "moderate and extreme views" and that there are views in the literature against the new economy concept. For example, Meyer (2001) argues that *new economy depends on how you define it and where you liv*e. It is beyond the scope of this paper to discuss these views.

Advent and Basic Features of New Economy

The developments in the information and communication technologies, globalization and rising global competition have been the fundamental factors in the advent of new economy. The economy and technology coexist and co-evolve to produce so-called *new economy*. Thus new economy can be formulized briefly as that *technology + economy = new economy* (Figure 1).

Similarly there is a close correspondence between new economy and globalization. The motto *"new economy is globalization's daughter"* by Furia (2000) sums up this correspondence very briefly and clearly.
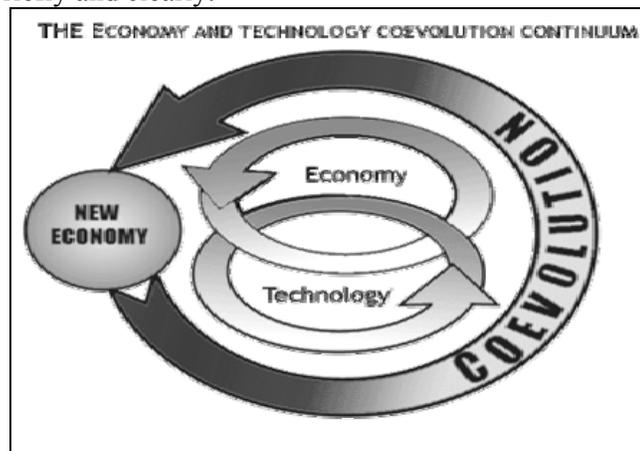
Figure 1: Creation of New Economy through Co-evolution.
Source: Tanjuakio, 2002, p.3

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[1] According to Kelly (1999) there are ten new rules for the new economy: 1) Embrace the swarm, 2) Increasing returns, 3) Plentitude, not scarcity, 4) Follow the free, 5) Feed the web first, 6) Let go at the top, 7) From places to spaces, 8) No harmony, all flux, 9) Relationship technology, 10) Opportunities before efficiencies (Kelly, 1999, p.161-162).

The close correspondence between technological developments, globalization and competition that are the dynamics of new economy can be worded variously. For instance, by reducing the cost of communication[2], information and communication technologies have helped to globalize product and capital markets. In turn, globalization spurs competition and therefore innovation, and speeds up the diffusion of new technologies through trade and investment (Berk, 2002, p.4). As a consequence of this close correspondence, the unseen successes have been achieved in the macroeconomic performance of economy. Likewise, in the 1995-2000 period of the USA economic performance far exceeded even optimistic forecasts with 4.1 % in real GDP growth, 3.2 % in real GDP per capita growth, 4.6 % in average unemployment and 1.7 % in average core inflation (Baily, 2001, p.203).

Table 1 has been arranged to display the key features of new economy. As can be seen from the table, new economy, on the contrary to old economy, is open to rivalry, man-centered, information-based, flexible, swift, changeable and digitalized.

At this stage, the query "Does it mean that new economy changes the basic rules of economy?" is beyond the scope of our paper.

Reflections of the New Economy on the Monetary Policy and Central Banking

The use of information and communication technologies in monetary sector commonly has emerged new payment instruments such as e-cash, network money and access products. Generally, becoming widespread of electronic payment instruments called electronic money (e-money)[3] has brought into the agenda the discussions among the economists related to whether there will be a "cashless world" or "cashless society". These discussions have revealed a wide literature studying the effects of electronic money on central banking and monetary policy.

Spread of new payment instruments which have become an indispensable unit of the new economy is of fairly important impacts on the future of central banks and monetary policy. The direction and the level of these impacts will depend on three factors: the changes in demand for central bank's reserves, money multiplier and the functioning of monetary transmission mechanism, which are discussed below.

Electronic Payment Technology and the Demand for Central Bank Reserves (Liabilities)

Along with the spread of electronic money, some arguments regarding the considerable decrease of central bank reserves have been put forward. Those arguments maintain that if the central bank reserves decrease, power of central bank to influence economic activities will increasingly weaken. Thus, the efficiency of monetary policy will diminish in parallel fashion.

There are five basic sources for the demand for the central bank reserves (Figure 2): 1) Reserve requirements on banks, 2) non bank public's demand for liquidity, 3) bank's demand for settlement[4] balances, 4) payment of tax obligations, 5) international interbank settlements (Palley, 2002, p.219; Arnone and Bandiera, 2004, p.13).

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[2] E.g. whereas the cost of a three-minute telephone call between New York and London was $ 244.65 in 1930, this cost fell to $3.32 in 1990 (IMF, World Economic Outlook, May, 1997, p.46).

[3] *Electronic money* is broadly defined as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts in the transaction, but acting as a prepaid bearer instrument (European Central Bank, 1998, p.7).

[4] *Settlement* is an act that discharges obligations in respect of funds or securities transfers between two or more parties (European Central Bank, 1998, p.41).

Table 1: Keys Features of Old Economy and New Economy

ISSUE	OLD ECONOMY	NEW ECONOMY
Markets		
Economic Development	Steady and linear, quite predictable	Volatile and chaotic
Market changes	Slow and linear	Fast and unpredictable
Lifecycle of Products and Tech.	Long	Short
Key Economy Drivers	Large industrial firms	Innovative entrepreneurial knowledge-based firms
Scope of Competition	Local	Global hyper competition
Market Structures	Stable	Dynamic
Competition: Name of the Game	Size: The big eats the small	Speed: The fast eats the slow
Marketing: Name of the Game	Mass marketing	Differentiation
Enterprise		
Organization of Production	Mass production	Flexible and lean production
Key Drivers of Growth	Capital / Labor	Innovation / Knowledge
Importance of Research/Innovation	Low – Moderate	High
Key Technology Drivers	Automation and mechanization	Digitization
Main Sources of Competitive Advantage	Lowering cost through economies of scale	Innovation, Quality, Time-to-Market, and Cost
Pace of business	Slow	Appreciably faster with ever-rising customer expectations
Emphasis on	Stability	Change management
Business Development Approach	Strategy pyramid: vision, mission, goals, action plans	Opportunity-driven, dynamic strategy
Success Measure	Profit	Market capitalization
Scarce Resource	Financial capital	Human capital
Decision Making	Vertical	Distributed
Innovation Processes	Periodic, linear	Continuous, systemic
Production Focus	Internal processes	Entire value chain
Strategic Alliances with Other Firms	Rare, "go alone" mindset	Teaming up to add complementary resources
Organizational Structures	Hierarchical, Bureaucratic	Networked
Work Force		
Leadership	Vertical	Shared: employee empowerment & self-leadership
Policy Goal	Full Employment	Higher real wages and incomes
Work force characteristics	Mainly male, high proportion of semi-skilled or unskilled	No gender bias; high proportion of graduates
Skills	Mono-skilled, standardized	Multi-skilled, flexible
Education Requirements	A skill or a degree	Continuous learning
Management-Employee Relations	Confrontation	Cooperation, Teamwork
Employment	Stable	Affected by market opportunity, and risk
Employees Seen as	Expense	Investment
Government		
Business – Government Relations	Impose Requirements	Encourage growth opportunities
Regulation	Command and Control	Market tools, Flexibility

Source: Atkinson and Court, 1998, p.7, and Kotelnikov, Vadim, http://www.e- coach.narod.ru/business_guide/crosscuttings/ new_economy_transition.html

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┌─────────────────────────────────────────────────────────────────────┐
│                          Demand for                                   │
│                       Central Bank's                                  │
│                          Reserves                                     │
│                                                                       │
│  Reserve      Nonbank Public's   Bank's Demand   Payment of Tax  International │
│  Requirements (households)       for Settlement  Obligation      Interbank     │
│  on Banks     Demand for         Balances                        Settlements   │
│               Liquidity                                                │
└─────────────────────────────────────────────────────────────────────┘
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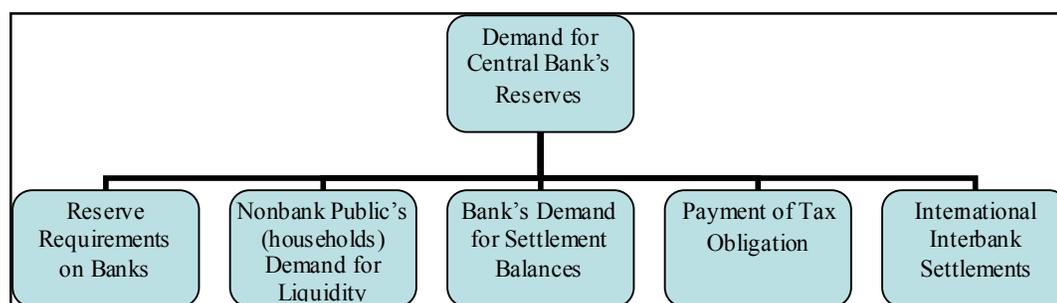
Figure 2: Demand for Central Bank's Reserves

Reserve requirements and households' demand for liquidity have constituted the most important sources of the demand for central bank's reserves[5] (Palley, 2002, p.220; Woodford, 2001, p.23). Therefore, the replacement of e-money for the government money will lead to a remarkable decrease in the central bank reserves. Both the influencing power of the overnight interest rates and the seigniorage revenue may be influenced negatively in parallel fashion. Seigniorage revenue here refers to the interest savings the government earns by issuing non-interest-bearing debt in the form of currency (Ely, 1996 p.3).

Banknotes in circulation represent the liabilities of central bank which do not provide interest profit (non-interest-bearing). As expressed in the previous part, with the spread of electronic money seigniorage revenue of central banks will gradually begin to decrease (Rahn, 2000, p.3). For instance, to Ely (1996), if private sector issues $10 million electronic money to the market, seigniorage revenue of the government will approximately diminish $ 600 million annually. The decrease of seigniorage revenues may cause that central banks can not cover their operation costs. As seigniorage revenues are one of the most significant income sources of national treasury at the same time, it can be also stated that there will be a decrease in the income of treasury. So, according to the Bank for International Settlements, among the G-10 countries, seigniorage as a percent of GDP ranged from low of 0.28 percent in United Kingdom and France to a high of 0.65 percent in Italy in 1996 (Bank For International Settlements, 1996, p.7).

The decrease in seigniorage revenues will also increase the possibility that central banks will be dependent on other income sources. This means that central banks may lose their financial independence and they may be exposed to much more political pressure.

Electronic Payment Technology and the Money Multiplier

The power of central banks and the efficiency of monetary policy stem from monopolistic powers on base money (monetary base). Base money consists of the sum of the bank's reserves at the central bank and the currency. Base money is also known as high-powered money. Its reason is that central banks can create changes in money supply as several times as money base thanks to the mechanism of central bank's money multiplier.

Money multiplier mechanism can be formulated as follows (Bank of Japan, 2000, p. 52-53; Selgin, 1996, p.1-2):

Money supply (M) is the sum of currency (C) and the bank deposit balance (D) and shown as following:

$$M=C+D \tag{1}$$

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[5] For example, the percentage of currency in central bank's liabilities in the USA, Canada and Japan is over 84 % (Bank For International Settlements, 1996 p.5).

Base money (H) is the sum of the bank's reserves at the central bank (R) and the currency (C) as following.

H=R+C   (2)

Therefore, the money multiplier (M/H) is written as

$$\frac{M}{H} = \frac{C+D}{R+C} = \frac{\frac{C}{D}+1}{\frac{R}{D}+\frac{C}{D}}$$ (3)

Note that C/D is public's desired currency-to-deposit ratio (c) and that R/D is the bank's desired reserve-to deposit ratio (r). The formula for the money multiplier becomes

m = (1+c) / (r+c)   (4)

where the total money stock is

M = mH   (5)

When electronic money appears, the money supply and money multiplier will be changed adding the electronic money balance E to equation (1) so that

M= $C' + D' + E$ (6)

Finally, the formula for the new money multiplier is that

$$\frac{M}{H} = \frac{C'+D'+E}{R'+C'} = \frac{\frac{C'}{D'}+\frac{E}{D'}+1}{\frac{R'}{D'}+\frac{C'}{D'}}$$ (7)

Comparing equations (7) with (3), along with the spread of electronic money it is easily understood that money multiplier will increase because with the use of electronic money instead of government money, both C/D $\rangle$ C'/D' and R/D $\rangle$ R'/D' will appear. In other words, currency-to-deposit ratio (c) and reserve-to deposit ratio (r) will decrease. In view of these explanations, it may be concluded that base money (H), money multiplier (m) and money supply (M) become unstable. In this case, the monetary policy strategy depending on monetary targeting will lose its efficiency. Nowadays it is accepted that this is one of the reasons why central banks give up monetary targeting and prefer inflation targeting strategies.

Electronic Payment Technology and the Monetary Transmission Mechanism

Monetary transmission mechanism being a complicated process describes how policy-induces changes in the nominal money stock or the short-term nominal interest rate impact on real variables such as aggregate output and employment (Ireland, 2005, p.1).

Central banks in transmission mechanism try to influence the households and firms' pricing behaviors through interest rate, exchange rate, asset price, credit, expectations and monetarist channels. But the process described below generally is quite complicated since many factors influence the process of monetary transmission mechanism.

The interest rate channel is a primary interaction channel both in macroeconomics models and monetary policy applications. That is why interest rate channel plays a crucial role in monetary transmission mechanism. Central banks try to attain inflation target through interest rate influencing expectations, asset prices and exchange rate (Figure 3).

Operation of this process effectively depends on the central banks' capability of controlling interest rates. This situation requires positive demand on government money because central banks can influence real economy through interest rates, which stems from its monopolistic power on money supply (Friedman, 1999, p.321; Woodford, 2001, p.50).

In this phase, the question arises whether central banks can control interest rates or not. There are various viewpoints on this subject. In general, it is asserted that the government

money demand may decrease as a consequence of the spread of electronic money. Therefore, central banks may not control interest rate.
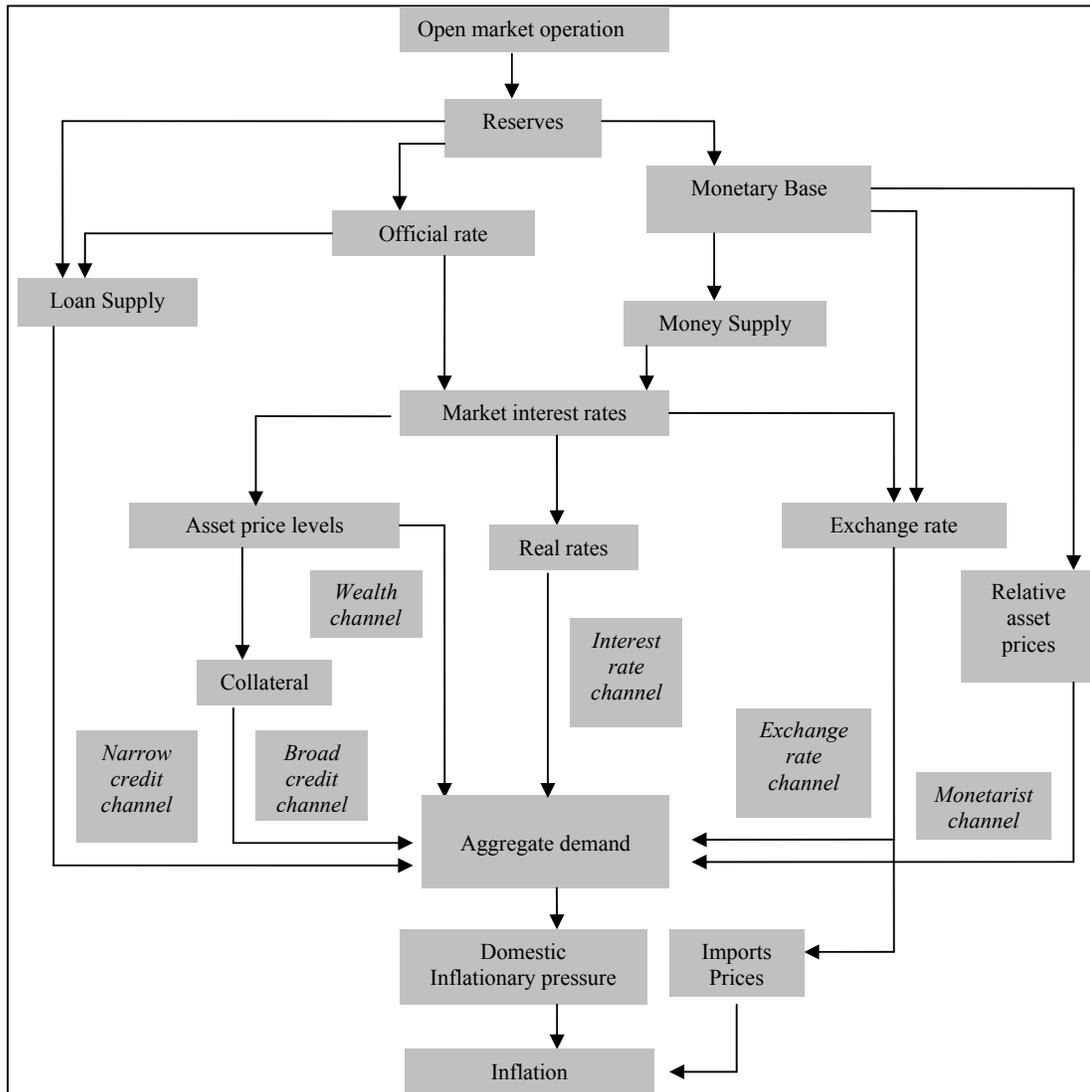
Figure 3: Monetary Transmission Mechanism

Source: Kuttner and Mosser, 2002, p.16

According to Fullenkamp and Nsouli (2004), as a result of the spread of e-banking services, interest sensitivity of money demand will enhance due to the decreasing operation costs. The macroeconomic effects of these changes are shown using a simple IS-LM model and are illustrated in Figure 4. Theoretically, the shifts in LM curve depend upon the interest sensitivity of money demand, and money supply[6]. The spread of e-banking increases the interest sensitivity of money demand, and money supply[7], which therefore make the LM curve flatter. As seen in figure 4, LM_1 curve will shift rightward into LM_2 due to the increase of interest sensitivity of money demand, and into LM_3 due to the increase in the sum of

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[6] Total money in economy will be the sum of government money and private e-money.

money supply through e-banking services. This means that the efficiency power of monetary policy in influencing macroeconomic variables will increasingly weaken.
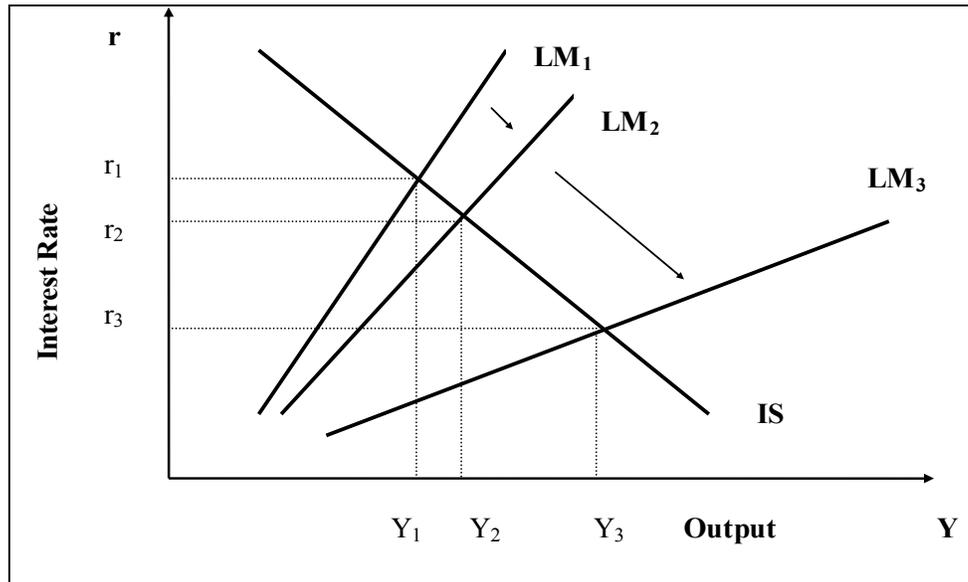
Figure 4: Combined Effect of E-Banking and Private E-Money
Source: Fullenkamp and Nsouli, 2004, p.11

Some economists heavily criticized the conclusion that central banks will have difficulty in controlling interest rates along the spread of electronic money (Cecchetti, 2002, p.19-20; Fullenkamp and Nsouli, 2004, p.23; Arnone and Bandiera, 2004, p.13; Palley, 2002, p.220; Delong, 2000, p.7; Bank of Japan, 2000, p.37; Berk, 2002, p.21; Freedman, 2000, p.21-22).

According to them, the demand for government money may continue *ad infinitum* and central banks are still capable of controlling interest rates because of the settlement operation of central banks, non-full substitution of government money with electronic money, reserve requirements for all payment instruments, interest-bearing central bank bills and central banks' position as lender of last resort operations.

Debate over Reflections of the New Economy on the Monetary Policy and Central Banking

It is possible to say that there exists a consensus among economists on the fact that the developments in the information and communication technologies will have impact on the monetary policy and central banking. Disagreement among them may stem from the degree of the impacts under consideration.

It is possible to divide into two groups the discussions on this issue.

In the first group the economists are advocating that there will not be radical changes in the monetary policy and central banking. This group does not disregard such probabilities that the activity of the monetary policy may diminish and central banks lose their financial independence. They, on the other hand, voice that these impacts should not be exaggerated. In this group are some economists such as Mesonnier (2001), Johnson (2001), Freedman (2000), Berk (2002), Goodhart (2000), Delong (2000), Cecchetti (2002), Arnone and Bandiera (2004), McCallum (2000), Woodford (2000, 2001), Plosser (2000), Palley (2002), Meyer (2001), Green (2001), and Ely (1996) and their views can be summarized as follows:

• Monetary policy is currently conducted in an environment very different from that of just 10 to 15 years ago. Acquisition of information is getting cheaper, easier and faster thanks to progressing technologies. Consequently, transaction costs are falling. Particularly, the fall in the transaction costs of banking services raises the securitization. These developments in the banking sector naturally affect the monetary transmission mechanism as well. Yet, the basic principles of the monetary policy and the role, objectives and targets of central banks will not change largely.

• As the demand for the government money sustains, the impact of central banks on interest rates does not cease completely. Besides, there is no historical evidence that none of the new means of payment instruments completely removes the government money. On the other hand, the fact that the electronic money holds much risk compared to the government money raises suspicions of whether this money can be used successively or not.

• The possibility that the seigniorage revenues of central banks will fall due to the prevalence of the electronic money is not very realistic. Because central banks can stabilize the fall in the seigniorage revenues through reserve requirements to e-money, central bank bill, interest payments of central banks on reserve balances, government deposits at the central bank, and being the lender of last resort operations.

• Being public institutions, central banks are not of any risk, do not face bankruptcy and can determine higher interest rates to preserve the demand for the government money. What is more, central banks are lender of last resort. Due to these reasons, the demand for the government money will never come to an end. Central banks, therefore, will sustain their functions in the following centuries, too. If someday there were a bad end of central banks, this would be not because of technological causes, but the outcome of their own incapability.

The economists in the second group advocate that, in the new economy, there will be important changes in the monetary policy and central banking. Among them are some economists defending that central banking can go bankrupt and even more vanish. Some of the economists in this group are King (1999), Dowd (1998), Rahn (2000), Friedman (1999, 2000), White (2001), and Cronin and Dowd (2001) and their views are as follows:

• Parallel to the progress in information technologies and financial markets, it is needless to discuss over whether or not central banks will function efficiently because historical evidence shows that central banks have never functioned effectively by far.

• Since the demand for government money will decrease, depending on the technologic breakthroughs in the long run, monetary policy may become ineffective and even disappear completely. Furthermore, when the demand for government money decreases, money supply should also decrease not to cause inflation. For this reason, central banks will have to withdraw their money. In this case, central banks will notably be deprived of seigniorage revenue. Consequently, even the bankruptcy of central banks may come to the agenda.

• In comparison with government money, electronic money has some advantages since it is easy to carry, reliable and hygienic. At the same time, electronic money operation costs will be reduced. So, the demand for electronic money will gradually increase and there is some concrete evidence on this point. Consequently, there may well be fewer central banks in the future.

• There is no reason, in principle, why final settlements could not be carried out by the private sector without the need for clearing through the central bank via the technologic innovations. Without such a role in settlements, central banks in their present form would no longer exist.

• The main issue is that technological innovations will impair the central bank's ability to carry out operations that reliably affect economic activity in the usual sense of real output and inflation.

Conclusion

Rapid developments in information and communication technologies have paved the way to significant changes in all sectors of economy as well as other fields. The dimension and content of the changes are briefly expressed via "the new economy" concept. There are differences in the content of this concept among the economists. While some economists assert that the new economy entails new rules (extreme view), the others defend that this change is usual (moderate view).

Taking into consideration that the changes in economy seem to continue depending on the various reasons, we think that it is better to use "*renewed economy*" instead of "new economy" because the economy is *ad infinitum* renewing itself.

The field that the developments in information and communication technologies influence most is monetary economy. Through the spread of e-money and e-banking services, the future of monetary policy and central banking is under question. As a result of the continuing debates, there have existed two different arguments. The first is that there will not be any change in the future of central banking and monetary policy. The second, including extreme views, is that monetary policy and central banking will no longer exist.

Having about over three hundred year-past, central banking has managed to keep up with the changes in economy by renewing itself. Also, they have become the forerunners and regulators of these changes. Thus, that the central banks have pioneered in the studies on electronic payment instruments is the evidence of this change. Moreover, shift from government money to electronic money appears to be a slow process, and this gives central banks adequate time to develop ways to meet the challenge to monetary policy.

Consequently, relying on the reasons investigated through the paper, the views that monetary policy and central banks will no longer exist in the future, is unrealistic. As far as we are concerned, central banks will continue to guarantee the stability of financial system all over the world as was the case in the past.

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Macroeconomic Issues

PPP Persistence within Sectoral Real Exchange Rate Panels

Christian J. Murray
Houston University

Hatice Özer - Ballı
Houston University

David H. Papell
Houston University

Recent studies about estimating half-lives of purchasing power parity argues that heterogeneity bias resulting from aggregating the real exchange rate across sectors is important and should be taken into account. However, they do not use appropriate techniques to measure persistence. In this paper we use the extended median-unbiased estimation method in panel context for each sector separately and calculate both point estimates and confidence intervals. We conclude that controlling for sectoral heterogeneity bias and small sample bias will not solve the PPP puzzle.

Introduction

In the field of international macroeconomics, the persistence of real exchange rate shocks has attracted many macro economists specifically concentrating on the Purchasing Power Parity puzzle. Rogoff (1996) describes the puzzle as the problem of reconciling the high short–term volatility of real exchange rates with an extremely slow rate at which shocks to dissipate. He explains a consensus view of 3 to 5 years of the half life of PPP deviations among some studies based on long-horizon data sets in which the fixed and floated exchange rate is mixed. There were several papers that attempted to estimate the half life to PPP but didn't use modern techniques for measuring the persistence of real exchange rate including Frankel (1986), Abuaf and Jorion (1990), and Lothian and Taylor (1996). For example Lothian and Taylor (1996) find evidence for long-horizon real exchange rates that they are mean reverting but the speed of reversion is very slow. They estimate the half-life for PPP deviations as 5.78 years for dollar-sterling real exchange rate. However this strongest evidence of mean reversion comes from the Least Square estimates.

Recently Murray and Papell (2002) use appropriate methods to measure the persistence of real exchange rates for long-horizon (annual) and post-1973 (quarterly) data. Their estimates accounts for the serial correlation and small sample bias. Using median unbiased estimates allowing for serial correlation on these two data sets, the point estimates of half lives are estimated as consistent with the "*consensus view*" while the confidence intervals are too wide providing no information on the size of the half-lives. Also, Murray and Papell (2005a) show that the methods used in Lothian and Taylor (1996) underestimate the half-lives of PPP deviations and overestimate the speed of mean reversion using median-unbiased estimation technique.

The recent study of Imbs, Mumtaz, Ravn and Rey (hereinafter IMRR) (2005) shows that sectoral heterogeneity matters for the persistence of relative prices. They use monthly non-harmonized price indices for consumption goods and services specifically for 19 foods categories and 13 countries for the period 1981-1995[1]. The aggregation bias which comes from heterogeneity is positive if there are no strong and systematic asymmetries in the price indices. They find that when the heterogeneity is taken into account, the half-life for sectoral real exchange rate decreases to 11 to 18 months which excludes the consensus view of Rogoff (1996). On the other hand, Chen and Engel (2004) reexamine the claim in IMRR. They investigate the same data set with a few corrections and additions. Then they find that the half-life estimate is even higher than Rogoff's claim. So they conclude the sectoral heterogeneity is not an important source of bias and it doesn't seem to explain the PPP puzzle.

This consensus view comes mostly from univariate studies of long-horizon data. Some recent panel studies includes Wu (1996), Papell (1997, 2002), and Fleissing and Strauss (2000) find shorter half-lives from the univariate studies. However they do not use the appropriate techniques to measure the persistence. Murray and Papell (2005b) using quarterly aggregate post-1973 data, extend the median unbiased estimation technique to the panel context. After estimating the point estimates and confidence interval estimates, they find strong evidence confirming the consensus view. Although panel regressions provide more information than the univariate regressions, they still do not help to solve the PPP puzzle.

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[1] Because harmonized price indices are available only for short period time.

Until now, there is no research that accounts for sectoral heterogeneity bias and for small sample bias[2]. Murray and Papell (2005b) paper uses panel regressions for aggregate data. Even though their estimates improve the results, since their data is at aggregate level, it doesn't address sectoral heterogeneity. So the main aim of the paper is to use their methodology and look at the sectoral data. We utilize IMRR (2005) monthly sectoral data set from Eurostat. We will calculate the point estimates and confidence intervals of the speed of adjustment to PPP for sectoral real exchange rates, in the panel context and using median-unbiased estimation technique. Using the nominal exchange rates and sectoral Consumer Price indices for USA and for other 12 European countries, we constructed the real sectoral exchange rates for the period 1981:01-1995:12.

The remainder of the paper is structured as follows. The next section focuses on the estimation techniques of persistence of PPP and demonstrates some examples using this data set for comparison reasons. Then the third section describes the details of data and presents estimation results. In the final section we give concluding remarks.

Estimation Techniques for Persistence of PPP

The aggregate real exchange rate with the United States dollar as the numeraire currency is calculated as

$$(1) \quad q = e + p^* - p$$

where q is the logarithm of the real exchange rate, e is the logarithm of the nominal (dollar) exchange rate, p is the logarithm of the domestic CPI, and p^* is the logarithm of the U.S. CPI. In particular the sectoral real exchange rate is calculated as (1). The only difference in the equation is as follows:

$$(2) \quad q_i = e + p_{i,US}^* - p_i$$

where q_i is the logarithm of the real exchange rate for the sector i, e is the logarithm of the bilateral nominal exchange rate between each country and the US dollar, p_i is the logarithm of the domestic CPI for the sector i and $p_{i,US}^*$ is the logarithm of the U.S. CPI for sector i.

Univariate Estimates

After we calculated the sectoral real exchange rates using equation (2) we can estimate the speed of adjustment to PPP. The Dickey-Fuller (DF) model regresses

$$(3) \quad q_{i,t} = c_i + \alpha_i q_{i,t-1} + u_{i,t}$$

the real exchange rate for each sector on a constant and its lagged level[3]. Then the half-live, the number of periods required for a unit shock to dissipate by one half, is calculated as $\ln(0.5)/\ln(\alpha)$.

This AR(1) specification is valid when the error terms are serially uncorrelated. When we take into account the serial correlation, we estimate the Augmented-Dickey Fuller regression (ADF):

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[2] Reidel and Szilagyi (2004) find that the interaction between the small sample bias and sectoral heterogeneity bias is non-trivial and these biases shouldn't be analyzed separately.
[3] We do not include a time trend to this regression as it would be theoretically wrong. See the details in Papell and Prodan (2004).

$$(4) \quad q_{i,t} = c_i + \alpha_i q_{i,t-1} + \sum_{j=1}^{k_i} \psi_{i,j} \Delta q_{i,t-j} + u_{i,t}$$

In this paper we choose the lag length, k, via the GS-general to specific- criterion studied by Hall (1994) and and Ng and Perron (1995)[4]. k_i denotes the sector specific lag length.

However there is a problem with the half-life estimation when we use Least Square estimates, because α is significantly downward biased when we have small sample[5]. To deal with the problem we use the exact bias correction which is median-unbiased estimator from Andrews (1993)[6]. He proposes a technique which allows us to calculate the exactly median-unbiased estimator of α and exact confidence intervals for this parameter. The essence of bias correction method for the LS estimator of α is as follows. If the LS estimator of α is equal to 0.9, say, we find the value of "α" such that the median of the least squares estimate is 0.9.

When we have a monotonic transformation, in our case the half-life: ln(0.5)\ln(α) is a monotonic transformation for α, the median unbiased estimator and its coverage probabilities of their confidence intervals are reserved. For example if the α_{MU} is a median unbiased estimator for α_{LS} then the half-life: ln(0.5)\ ln(α_{MU}) will be median unbiased too.

For the Dickey-Fuller regression, it is easier to calculate the median-unbiased estimator of HL as it is assumed that the HL calculated from AR (1) model shows that the shocks to the real exchange rate die out monotonically. Briefly, we estimate the α_{LS} from equation (3) and estimate α_{MU} looking at the tables of Andrews (1993) then we calculate the HL: ln(0.5)\ ln(α_{MU}) and the speed of convergence to PPP.

[4] The is also another lag selection method by Ng and Perron (2001) called modified Akaike information criterion (MAIC). Due to high computational expenses we will not apply this method for sensitivity analysis.
[5] In Andrews (1993): If the AR models that contain an intercept and α is very large (close to 1) then there is a significant downward bias in the standard parameters.
[6] Other than median-unbiased technique, there is also mean-unbiased ness to correct for the small sample bias of least square estimators. Mean-unbiased ness means that the expected value of an estimator is equal to the true parameter value. Killian (1998) suggested similar corrections based on mean-unbiased estimates of AR parameters. He estimated the bias corrected AR coefficients and confidence intervals for impulse response functions by applying a bootstrap-after-bootstrap method. However even though both method will work well under AR(p>1), for estimating the half-life for AR(1) mean unbiased ness technique will not be unbiased under the HL transformations. To be consistent throughout the paper we will use median-unbiased technique for all models.

Table1. Exactly Median Unbiased Half-lives in Dickey-Fuller Regressions
Aggregate Monthly data: 1981:01- 1995:12

$$q_t = c + \alpha q_{t-1} + u_t$$

country	α_{LS}	α_{MU}	95%CI MU	HL_{MU} (yearly)	95%CI(yearly) For HL_{MU}
Belgium	0.9884	1	[0.975,1]	∞	[2.28, ∞]
Germany	0.9903	1	[0.980,1]	∞	[2.86, ∞]
Denmark	0.9923	1	[0.985,1]	∞	[3.82, ∞]
Spain	0.9931	1	[0.985,1]	∞	[3.82, ∞]
Italy	0.9879	1	[0.975,1]	∞	[2.28, ∞]
France	0.9856	1	[0.970,1]	∞	[1.90, ∞]
Greece	0.9882	1	[0.975,1]	∞	[2.28, ∞]
Netherlands	0.9864	1	[0.975,1]	∞	[2.28, ∞]
Portugal	0.9961	1	[0.990,1]	∞	[5.75, ∞]
Finland	0.9865	1	[0.975,1]	∞	[2.28, ∞]
United Kingdom	0.9683	0.99	[0.945,1]	5.75	[1.02, ∞]

Note: The sample sizes are 179 for each country. Using the method in Andrews (1993) paper for T+1=179 the tables for median unbiased estimators are simulated.

For demonstration look at the Table 1 which prints the exactly median unbiased half-lives for aggregate monthly data. For example, in Germany while α_{LS} is 0.9903, α_{MU} is 1 like most of the other countries. So the size of the bias is -0.0097 proving the downward bias in the least square estimate. The half life median unbiased estimates are infinity for all European countries except for United Kingdom which can be considered as in the consensus view as HL_{MU} is 5.75 years.

**Table 2. Exactly Median Unbiased Half-lives in Dickey-Fuller Regressions :
Sectoral Monthly data for Germany : 1981:01- 1995:12**

$$q_{i,t} = c_i + \alpha_i q_{i,t-1} + u_{i,t}$$

sectors	No:	Sample size	α_{LS}	HL_{LS} (yearly)	α_{MU}	95%CI MU	HL_{MU} (yearly)	HL_{MU} (yearly) 95%CI
Bread	1	173	0.9860	4.1	1	[0.97,1]	∞	[1.9, ∞]
Meat	2	175	0.9891	5.29	1	[0.975,1]	∞	[2.28, ∞]
Dairy	3	175	0.9890	5.21	1	[0.975,1]	∞	[2.28, ∞]
Fruits	4	175	0.8731	0.43	0.89	[0.815,0.975]	0.5	[0.28,2.28]
Tobacco	5	175	0.9470	1.06	0.97	[0.91,1]	1.9	[0.61, ∞]
Alcohol	6	175	0.9926	7.73	1	[0.985,1]	∞	[3.82, ∞]
Clothing	7	175	0.9970	19.3	1	[0.99,1]	∞	[5.75, ∞
Footwear	8	175	0.9995	116	1	[0.995,1]	∞	[11.5, ∞]
Rents	9	175	0.9993	83.2	1	[0.995,1]	∞	[11.5, ∞]
Fuel	10	175	0.9855	3.94	1	[0.97,1]	∞	[1.9, ∞]
Furniture	11	166	0.9943	10.1	1	[0.985,1]	∞	[3.82, ∞]
Dom.Appl.	12	166	0.9939	9.46	1	[0.985,1]	∞	[3.82, ∞]
Vehicles	13	175	0.9992	73.5	1	[0.995,1]	∞	[11.5, ∞]
Pub.Transp.	14	175	0.9823	3.24	1	[0.965,1]	∞	[1.62, ∞]
Comm.	15	175	0.9669	1.72	0.99	[0.94,1]	5.75	[0.93, ∞]
Sound	16	175	0.9938	9.24	1	[0.985,1]	∞	[3.82, ∞]
Leisure	17	175	0.9882	4.88	1	[0.975,1]	∞	[2.28, ∞]
Books	18	175	0.9884	4.95	1	[0.975,1]	∞	[2.28, ∞]
Hotels	19	175	0.9473	1.07	0.97	[0.91,1]	1.9	[0.61, ∞]

Note: Using the method in Andrews (1993) paper for T+1=sample size (n) the tables for median unbiased estimators are simulated.

Murray and Papell (2002) compute the same table for more countries and for the quarterly data in the longer period of time 1973:01-1998:02. Their estimates for HL_{MU} are much smaller because when we go from quarterly data to monthly data the more serial correlation happens, persistence increases. Monthly data contains more noise causing the estimates for half-life to rise.

Table 2 shows the exactly median unbiased half-lives for sectoral monthly data only for Germany[7]. Because of the sectoral heterogeneity bias α_{MU} is not equal to 1 in all sectors as it was 1 at the aggregate level[8]. When we focus on the average of half lives of lower confidence intervals, it is 3.82 years which is higher than the aggregate level of that (2.82 years). The puzzle seems to get worse in contrast to the result in IMRR (2005).

As for Augmented Dickey-Fuller regression, when there is a serial correlation we have to model it as AR(p). Andrews and Chen (1994) extend the median unbiased estimator to the AR(p) case. They introduce approximately median-unbiased estimators and confidence intervals for univariate AR(p) models[9]. However in this case to be able to estimate the HL, it is not sufficient to estimate α, as the shocks do not decay at a constant rate. So we utilize the impulse response function of an AR (k+1=p) to calculate the half-lives. Andrews and Chen

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[7] These sectoral half lives are estimated for all the European countries. Germany is been chosen randomly just to emphasize the difference in half lives between the sectoral and aggregate data levels.
[8] Usually the half-life median unbiased estimate for sectors 4, 15 and 19, for almost all the European countries are consisted with the consensus view.
[9] The approximation is twofold. The first reason is due to the use of estimators rather than true parameters in the first stage (usual statistical sense). The second reason is due to the use of pseudorandom numbers (numerical sense). See AC(1994) for more explanations.

(1994) proves that their technique for AR(2) is median unbiased for all lags but for higher order AR models (p>2), the impulse response estimates are downward median-biased. However the downward bias is worse in the least square estimates.

Andrews and Chen (1994) describes a computationally intensive and iterative method for obtaining approximately median-unbiased estimators of the parameters of the univariate augmented Dickey-Fuller model $(\alpha, \psi_1, \ldots, \psi_k)$. The basic intuition is the same as to find median-unbiased estimate for AR(1) case. Since $\psi_1, \ldots, \psi_k$ are unknown, they suggest a simple iterative procedure that yields an approximately median-unbiased estimator. First, compute the least square estimates of $\alpha, \psi_1, \ldots, \psi_k$ using ADF regression. Second treating these $\psi_{1,LS1}, \ldots, \psi_{k,LS1}$ as though they were true values compute the $\alpha_{1,AMU}$. Third treating $\alpha_{1,AMU}$ as though it was the true value of α and compute a second round of least square estimators $\psi_{1,LS2}, \ldots, \psi_{k,LS2}$ (regressing $q_t - \alpha_{1,AMU}*q_{t-1}$ on $\Delta q_{t-1}, .. \Delta q_{t-k}, 1$). Next treat the new $\psi_{1,LS2}, \ldots, \psi_{k,LS2}$ as though they were true values compute the $\alpha_{2,AMU}$. Continue to this procedure either for fixed number iterations or until convergence, and call this α_{AMU}. In our paper we will continue till convergence occurs.

Table 3. Approximately Median Unbiased Half-lives in Augmented Dickey-Fuller Regressions : Sectoral Monthly data for Germany: 1981:01- 1995:12

$$q_{i,t} = c_i + \alpha_i q_{i,t-1} + \sum_{j=1}^{k_i} \psi_{i,j} \Delta q_{i,t-j} + u_{i,t}$$

sectors	No:	Sample size	k	α_{LS}	HL_{LS} (yearly)	α_{MU}	95%CI MU	HL_{MU} (yearly)	HL_{MU} (yearly) 95%CI
Bread	1	173	1	0.9807	2.96	1	[0.965,1]	∞	[1.62, ∞]
Meat	2	175	17	0.9864	4.21	1	[0.965,1]	∞	[1.62, ∞]
Dairy	3	175	1	0.9828	3.34	1	[0.965,1	∞	[1.62, ∞]
Fruits	4	175	24	0.8174	0.29	0.965	[0.745,1]	1.62	[0.2, ∞]
Tobacco	5	175	1	0.9437	1	0.97	[0.91,1]	1.9	[0.61, ∞]
Alcohol	6	175	1	0.9868	4.35	1	[0.975,1]	∞	[2.28, ∞]
Clothing	7	175	1	0.9909	6.29	1	[0.98,1]	∞	[2.86, ∞]
Footwear	8	175	1	0.9941	9.81	1	[0.985,1]	∞	[3.82, ∞]
Rents	9	175	1	0.9939	9.38	1	[0.985,1]	∞	[3.82, ∞]
Fuel	10	175	21	0.9858	4.02	1	[0.96,1]	∞	[1.41, ∞]
Furniture	11	166	1	0.9898	5.62	1	[0.98,1]	∞	[2.86, ∞]
Dom.Appl.	12	166	1	0.9845	3.69	1	[0.98,1]	∞	[2.86, ∞]
Vehicles	13	175	21	0.9942	9.95	1	[0.98,1]	∞	[2.86, ∞]
Pub.Transp.	14	175	17	0.9783	2.63	1	[0.955,1]	∞	[1.25, ∞]
Comm.	15	175	17	0.9678	1.77	0.985	[0.935,1]	3.82	[0.86, ∞]
Sound	16	175	17	0.9861	4.13	1	[0.97,1]	∞	[1.9, ∞]
Leisure	17	175	10	0.9818	3.15	1	[0.965,1]	∞	[1.62, ∞]
Books	18	175	1	0.9841	3.61	1	[0.97,1]	∞	[1.9, ∞]
Hotels	19	175	24	0.9373	0.89	0.97	[0.865,1]	1.9	[0.4, ∞]

note: The sectoral Germany data is tested for k_{max} equal to 24 to select the lag lengths via GS method. Using the method in Andrews and Chen (1994) paper for T+1=sample size, the converged median unbiased estimators are estimated.

For comparison reasons, both quarterly and monthly aggregate data for the same period of time are employed to compute approximately Median Unbiased Half life estimates[10]. In sum the upper confidence intervals are infinity in both cases but the average of lower confidence intervals is 1.794 years and 1.235 years for monthly and for quarterly

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[10] The tables can be sent upon request. Quarterly data is taken from MP(2002). The maximum lag length is set to 12 and 24 for quarterly data and for monthly data respectively.

respectively. Again the increase in the half-life boundaries is confirmed with the increase in the frequency of data.

In Table 3 the approximate median unbiased half-lives for sectoral monthly data only for Germany is presented. When we consider the serial correlation there is only a small change with the half-life median unbiased estimate. It is either the same or less except for sector 4 (there is an increase from 0.5 years to 1.62 years). At the average the lower confidence intervals for median unbiased estimates gets smaller. So when we incorporate the serial correlation and estimate ADF regressions the confidence intervals get wide.

Panel Estimates

The panel extensions for DF and ADF allowing for heterogeneous intercept would be defined as (5) and (6) respectively:

$$(5) \quad q_{i,m,t} = c_{i,m} + \alpha q_{i,m,t-1} + u_{i,m,t} \quad (\text{DF})$$

$$(6) \quad q_{i,m,t} = c_{i,m} + \alpha q_{i,m,t-1} + \sum_{i=1}^{k_{i,m}} \psi_{i,m,j} \Delta q_{i,m,t-j} + u_{i,m,t} \quad (\text{ADF})$$

where the subscript m indexes the country so $c_{i,m}$ indicates the country-specific intercept. $k_{i,m}$ is the lag length for the sector i and country m. In the ADF regression we allow for serially and contemporaneously correlated errors too. In this panel unit root test we restrict the value of α to be equal across countries following Levin, Lin and Chu (2002)[11]. To be able to estimate these panel estimations when we allow for contemporaneously correlated residuals, we use Feasible GLS which is the seemingly unrelated regressions.

In the panel DF and ADF models, we will use only α to estimate the half-life because the lag lengths, $k_{i,m}$ and the serial correlation coefficients differ across countries within the same sector. The small sample bias still exists in the panel construction. As in the univariate case we will exploit from Andrews (1993) and Andrews and Chen (1994) median unbiased estimators. Murray and Papell (2005b) extend their median unbiased estimation technique to the panel context[12]. When there is a serial correlation, the median-unbiased estimator of α is no longer exact, but it is approximate. This comes from the fact that the true serial correlation coefficients ($\psi_{i,m,j}$) are unknown and median unbiased estimator of α depends on these true values.

Philips and Sul (2003) discuss the monotonicity of median function in panel context and they conclude that for N≥5 and T≥20 median function is monotonic. Since in our panel simulations N=10 and T is at least 166 the median function is monotonic therefore the median unbiased estimate is always unique.

Estimation Results

This paper re-examines the IMRR data set for aggregation bias and small sample bias. It is originally from Eurostat, a statistical data source of European Union. The data consists of

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[11] For further details please read Levin, Lin and Chu (2002).
[12] Further details can be found in Murray and Papell (2005b).

two-digit non-harmonized sectoral price indices for 19 sectors (good categories and services) and 13 countries. The data is monthly for the period 1981:01-1995:12[13].

Table 4. Approximately Median Unbiased Half-lives in PANEL Unit Root Regressions : Sectoral Monthly data for the period: 1981:01- 1995:12

$$q_{i,m,t} = c_{i,m} + \alpha q_{i,m,t-1} + \sum_{j=1}^{k_{i,m}} \psi_{i,m,j} \Delta q_{i,m,t-j} + u_{i,m,t}$$

sectors	No:	Sample size	α_{LS}	HL_{LS} (yearly)	α_{MU}	95%CI MU	HL_{MU} (yearly)	HL_{MU} (yearly) 95%CI
Bread	1	173	0.98288	3.34	1	[0.99,1]	∞	[5.75,∞]
Meat	2	175	0.96777	1.76	0.985	[0.965,1]	3.82	[1.62,∞]
Dairy	3	175	0.96616	1.68	0.985	[0.965,1]	3.82	[1.62,∞]
Fruits	4	175	0.93374	0.84	0.955	[0.93,0.985]	1.25	[0.8,3.82]
Tobacco	5	175	0.97417	2.21	1	[0.975,1]	∞	[2.28,∞]
Alcohol	6	175	0.9839	3.56	1	[0.99,1]	∞	[5.75,∞]
Clothing	7	175	0.98857	5.02	1	[1,1]	∞	[∞,∞]
Footwear	8	175	0.98304	3.38	1	[0.99,1]	∞	[5.75,∞]
Rents	9	175	0.98399	3.58	1	[0.99,1]	∞	[5.75,∞]
Fuel	10	175	0.95911	1.38	0.975	[0.955,1]	2.28	[1.25,∞]
Furniture	11	166	0.97798	2.59	1	[0.985,1]	∞	[3.82,∞]
Dom.Appl.	12	166	0.97599	2.38	1	[0.98,1]	∞	[2.86,∞]
Vehicles	13	175	0.98544	3.94	1	[0.995,1]	∞	[11.5,∞]
Pub.Transp.	14	175	0.9629	1.53	0.985	[0.96,1]	3.82	[1.41,∞]
Comm.	15	175	0.97501	2.28	0.995	[0.98,1]	11.5	[2.86,∞]
Sound	16	175	0.97943	2.78	1	[0.98,1]	∞	[2.86,∞]
Leisure	17	175	0.97514	2.29	1	[0.98,1]	∞	[2.86,∞]
Books	18	175	0.98506	3.84	1	[0.995,1]	∞	[11.5,∞]
Hotels	19	175	0.97899	2.72	1	[0.98,1]	∞	[2.86,∞]

note: The sectoral data is tested for k_{max} equal to 24 to select the lag lengths via GS method. Using the method in Murray and Papell (2005) paper the estimates for median unbiased half lives in panel context are estimated. We exclude Finland from all sectors because it has much smaller sample size causing to lose a lot of information in the panel regressions. For sectors 9 and 16 we do not have data for Portugal. Also for sector 5 we couldn't include Italy's data as there are less data in that sector only.

First of all we used the General to Specific (GS)[14] method to select lag lengths for the panel unit root regressions . Since it is a monthly data we set the lag length to 24. We calculate approximately median unbiased point estimates and confidence intervals for half-lives of PPP deviation in ADF panel context for each sector separately.

The results are reported in Table 4. When we consider the sectoral heterogeneity bias and small sample bias in the panel regressions, surprisingly the half-life median unbiased estimates rise with infinite upper confidence limit. We find the average of half life least square estimates for 19 sectors as 2.69 years which is slightly greater than 2.35 years that Murray and Papell (2005b) estimated[15]. When we compared the median unbiased half lives we have a huge difference. We estimated it as infinity in almost all sectors excluding only 6 sectors which are meat, dairy, fruits, fuel, public transformation and communication. In the

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[13] see data appendix from IMRR (2005) for more details. 14 see Hall (1994) and Ng and Perron (1995).
[14] see Hall (1994) and Ng and Perron (1995).

[15] Murray and Papell (2005) data set includes 9 more countries than our data set which can make big differences.

panel regressions the confidence intervals are tighter than their univariate estimates. Since the upper bounds are infinity in both cases it is hard to measure the difference. However looking at the lower bounds we see that width of the intervals get smaller.

At the average the HL$_{MU}$ is infinity while in Murray and Papell (2005b) paper it is estimated as 2.5 years. All the upper confidence intervals for HL$_{MU}$ (except fruit sector which has 3.82 years) are infinity too. When we exclude clothing, the average of lower confidence intervals for HL$_{MU}$ is 4.06 years. It seems that accounting for heterogeneity bias worsens the PPP puzzle instead of helping to solve it. Also the main conclusion is consistent with Chen and Engel (2004).

Conclusion

The basic problem with the real exchange rate theories is that we have highly volatile real exchange rate and deviations from PPP that are much more persistent than can be explained by conventional theories such as nominal price rigidities. The purpose of this paper was to use Murray and Papell's (2005) methodology which estimates the median unbiased half-lives in panel context, and by utilizing IMRR (2005) monthly sectoral data set to see if these methods help to solve the "Purchasing Power Parity Puzzle". When we account for sectoral heterogeneity bias and for small sample bias, we still can not solve the PPP puzzle. The speed of mean convergence for real exchange rate is too slow.

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Macroeconomic Issues

The Impact of the EMU on Channels of Risk Sharing between Member Countries

Faruk Ballı
University of Houston

Bent E. Sørensen
University of Houston

We estimate the amount of income and consumption smoothing (risk sharing) between countries in the European Monetary Union (EMU) and between other developed countries during the period 1970–2003. In particular, we examine if EMU countries display different patterns of risk sharing than other developed countries in the period leading up to and following the formation of the EMU in 1999. We find that income smoothing from international factor income has increased in the EMU since the introduction of the EMU and that consumption smoothing from procyclical government saving has declined steeply in the EMU since the signing of the Maastricht treaty

Introduction

Income and consumption smoothing between states in a monetary union are potentially important for the functioning of the union because monetary policy is unable to address "asymmetric" shocks, where some countries experience negative shocks while others are booming. Sala-i-Martin and Sachs (1992) suggested that the risk sharing provided to states

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by the U.S. federal government may be essential in making the United States a successful "monetary union."[1]

We refer to the situation where consumption grows at identical rates in all countries as full risk sharing. We refer to the growth rate of a country-level variable minus the union-wide counterpart as the "idiosyncratic" growth-rate and we say that risk sharing is higher the less idiosyncratic consumption growth co-varies with idiosyncratic income growth. There are different ways that countries can obtain risk sharing which we refer to as channels of risk sharing. The main channels are cross-ownership of assets that "smooth" income (making income growth in a country less sensitive to output growth in that country), transfers that smooth disposable income for given income, and borrowing and lending that smooth consumption for given disposable income. Asdrubali, Sørensen, and Yosha (1996) (ASY) derived a simple way of quantifying the relative contributions of various channels of income and consumption smoothing within a common framework. ASY found, for U.S. states, that market institutions provide the bulk of risk sharing through income smoothing Sorensen and Yosha (1998) (SY) used similar methods to evaluate channels of risk sharing between EU and OECD countries and found that the bulk of risk sharing was provided by procyclical government saving with some risk sharing provided by corporate saving at shorter horizons.

In this paper, we explore risk sharing patterns among EMU countries and, for comparison, long-standing non-EMU European Union (EU)-countries as well as other developed countries in the Organization for Economic Cooperation and Development (OECD). Our paper updates and expands on the results of SY.

Mundell (1961) defined an optimum currency area as one where internal factor mobility is high although two other criteria may be as important as labor mobility in the face of adverse idiosyncratic country shocks. One obvious criteria is whether such asymmetry is prevalent. Frankel and Rose (1998), in a provocative article, argued that countries that this criteria may actually be endogenous to the formation of currency unions: A currency union is likely to generate more trade among its members and Frankel and Rose find that "more trade" leads to less asymmetry between the trading countries.

It is feasible, indeed likely, that risk sharing is also endogenous to the formation of a currency union.[2] A common currency is likely to reduce the costs of trading or information gathering in asset trade and therefore lead to higher cross-ownership of financial assets. The removal of currency risk may further stimulate foreign direct investment and the integration of bond markets—already documented for the EMU see, for example, Adam et al. (2002) and Baele et al. (2004)—will imply deeper and more liquid markets for borrowing and lending.[3]

Less obvious is how important these effects are quantitatively for, in particular, the EMU. Six years have passed since the adoption of the Euro and while integration of financial markets likely takes time to evolve making it to early to draw definitive conclusions, we can get a preliminary reading.[4]

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[1] See also von Hagen (1992), Atkeson and Bayoumi (1993), Goodhart and Smith (1993), and Bayoumi and Masson (1995).

[2] De Grauwe and Mongelli (2005) consider more generally how the criteria for optimally of currency areas may be endogenous and provides evidence from the EMU.

[3] Sørensen, Wu, Yosha, and Zu (2005) show that larger holdings of foreign assets are associated with more international risk sharing. Demyanyk, Ostergaard, and Sørensen (2005) demonstrate that the integration of the banking markets of U.S. states was following by increasing income smoothing.

[4] Shocks to the EMU economies have become more shallow in the last decade as documented by, for example, Ginannone and Reichlin (2005)—potentially reducing the importance of risk sharing. This reduced volatility seems to be a world-wide phenomenon and the reasons for it are not well understood, leaving open the possibility that this is a temporary pattern.

We find that smoothing through factor income flows—resulting from international crossownership of assets—has increase steeply in the EMU. On the other hand, smoothing of consumption through government counter-cyclical saving has virtually disappeared for the group of EMU countries leading to less overall risk sharing. Whether this pattern is due to the constraints on fiscal deficits imposed by the Growth and Stability pact and whether it is a permanent pattern remains to be seen as the monetary union matures.

Full risk sharing and perfect consumption smoothing: Theory

The basic theory of international risk sharing is well known—see Obstfeld and Rogoff (1996)—and we only outline the basic ideas for endowment economies. We think of GDP as a homogeneous tradable good. The period t per capita output of country i is an exogenous random variable with a commonly known probability distribution. Let the representative consumer of each country be a risk averse expected utility maximizer who derives utility from consumption.[5] Assume that consumers within each country are identical with felicity ranked by Constant Relative Risk Aversion utility function and that perfect Arrow-Debreu markets for contingent claims exist. Optimal consumption then satisfies the full risk sharing relation $c_t^i = k^i \, c_t^W$, where k_i is a country specific constant, c_t^i is country i per capita consumption, and c_t^W is world per capita consumption in period t. An implication is that when risk is fully shared among countries, the consumption of a country comoves with world consumption but not with country specific shocks.

If the period t utility function of country i is $\theta_t^i \, u(\cdot)$ where θ_t^i is an idiosyncratic taste shock (normalized so that $\Sigma_i (1/\theta_t^i) = 1$ in all periods), then consumption, assuming perfect markets for contingent output, will satisfy the relation $c_t^i = \theta_t^i \, k^i \, C_t^W$, in any state of nature. Consumption in country i is no longer a fixed fraction of world consumption, as is the case when there are no idiosyncratic taste shocks, but the central property of equation (1) is preserved—the consumption of country i is affected by aggregate shocks and by idiosyncratic taste shocks, but not by other idiosyncratic shocks (including income shocks).

The testable implication that we will focus on is that consumption growth rates are identical for all countries; i.e.,

$$\Delta \log c_t^i = c + \Delta \log c_t^W + \epsilon_{it},$$

where c is a constant and ϵ_{it} is an error term—due to either taste shocks or noise—which is uncorrelated with output growth.

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[5] We do not consider non-separabilities in the utility function between consumption and leisure or nontradable output. See Canova and Ravn (1996) and Lewis (1996) for a treatment of these issues in the context of international risk sharing.

Regression based tests for full risk sharing at the country level were conducted by Obstfeld (1994), Canova and Ravn (1996) and Lewis (1996).[6] A comprehensive survey of research on international diversification is provided in Lewis (1995).[7]

Even if full risk sharing is rejected it is important to quantify the extent to which risk is shared within a group of economic agents, countries in our case. It is also interesting to identify the exact channels through which risk is shared, and to quantify the amount of risk sharing obtained via each channel. ASY developed a method for answering these questions. The method takes equation (1) as a benchmark, and quantifies the deviation from this benchmark, interpreting the deviation as the amount of risk that is not shared. We turn to a presentation of the conceptual framework and the method of measuring deviations from the full risk sharing allocation.

Channels of Income Insurance and Consumption Smoothing

There are several mechanisms for sharing risk among countries. The most natural way or sharing risk internationally is through international income diversification; i.e., through cross-border ownership of productive assets. Net income from foreign assets is reflected in the National Accounts data as the difference between Gross Domestic Product (GDP) and Gross National Income (GNI).[8]

If risk is fully shared through this channel GNI will satisfy equation (1):

$$\Delta \log \text{GNI}_t^i = c \; + \; \Delta \log \text{GNI}_t^{\text{w}} \; + \; \epsilon_{it}.$$

(2)

If risk is not fully shared through factor income flows, GNI does not satisfy equation (1) and there may be scope for further income smoothing. One source of income smoothing is simply that the amount of depreciation doesn't vary one-to-one with GDP—this source of risk sharing is not very interesting but it is included because we want to consider all "wedges" between GDP and consumption. GNI minus depreciation is (net) National Income (NI). Income can further be smoothed through international transfers. We refer to NI plus net (incoming) international transfers as Disposable National Income (DNI).

If DNI is not perfectly diversified there is room for consumption smoothing through procyclical saving behavior. Individuals decide on their saving in order to smooth consumption intertemporally. If the shocks to GDP that are not smoothed through international factor income flows are highly persistent, individuals may—if there behavior is guided by permanent income considerations—-optimally choose to engage in very little consumption smoothing through saving although patterns of life-cycle saving may or may not help smooth consumption. If the shocks to GDP that are not smoothed through international factor income flows are transitory, individuals will optimally choose to engage in much consumption smoothing through saving.[9]

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[6] The first tests for full risk sharing, using individual-level data were performed by Cochrane (1991), Mace (1991) and Townsend (1994).

[7] The International Real Business Cycle literature, most notably Backus, Kehoe, and Kydland (1992), Baxter and Crucini (1995) and Stockman and Tesar (1995) have examined the of full risk sharing in the absence of taste shocks, that the correlation of consumption across countries should be equal to unity. The data are, however, far from confirming that prediction.

[8] GNI was previously called Gross National Product (GNP).

[9] Baxter and Crucini's (1995) showed that even if is no income insurance through factor income flows but a riskless asset that can be traded then, if shocks to GDP are transitory, equation (1) will be closely approximated. That is, when shocks to GDP are transitory, a riskless bond (the credit market) is a close substitute for income insurance (i.e. for capital markets). In contrast, if shocks to GDP are highly persistent, consumption smoothing through trade in a riskless bond will not approximate the allocation in equation (1), namely, the credit market

The variance decomposition described below allows us to measure the fraction of shocks to GDP that are smoothed through international factor income flows, through saving, and the fraction of shocks that are not smoothed, namely, the residual deviation of the international consumption allocation from equation (1), the full risk sharing benchmark.

Decomposing the Cross-Sectional Variance of Shocks to GDP

We turn to the cross-sectional variance decomposition of shocks to GDP—for further details and interpretation see ASY or SY. Consider the identity, holding for any period t,

$$\text{GDP}^i = \frac{\text{GDP}^i}{\text{GNI}^i} \frac{\text{GNI}^i}{\text{NI}^i} \frac{\text{NI}^i}{\text{DNI}^i} \frac{\text{DNI}^i}{\text{C}^i + \text{G}^i}(\text{C}^i + \text{G}^i),$$

where all the magnitudes are in per capita terms, and i is an index of countries. To stress the cross-sectional nature of our derivation, we suppress the time index.

Now take logs and differences on both sides of (3), multiply both sides by _log GDPi (minus its mean) and take the cross-sectional average, obtaining the variance decomposition

$$\text{var}\{\Delta \log \text{GDP}^i\} = \text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}$$

$$+ \text{cov}\{\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i, \Delta \log \text{GDP}^i\}$$

$$+ \text{cov}\{\Delta \log \text{NI}^i - \Delta \log \text{DNI}^i, \Delta \log \text{GDP}^i\}$$

$$+ \text{cov}\{\Delta \log \text{DNI}^i - \Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\}$$

$$+ \text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\} .$$

In this equation "var $\{$ X $\}$" and "cov $\{$ X,Y $\}$" denote the statistics $\frac{1}{N}\sum_{i=1}^{N}(X^i - \bar{X})^2$ and $\frac{1}{N}\sum_{i=1}^{N}(X^i - \bar{X})(Y^i - \bar{Y})$, respectively, where N is the number of countries in the sample. Dividing by var $\{\Delta \log \text{GDP}^i\}$ we get

$$1 = \beta_f + \beta_d + \beta_r + \beta_s + \beta_u, \tag{4}$$

where, for example,

$$\beta_f = \frac{\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}} \tag{5}$$

is the ordinary least squares estimate of the slope in the cross-sectional regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$ and similarly for $\beta_d, \beta_r, \text{ and } \beta_s.$ The last coefficient in the decomposition is given by:

$$\beta_u = \frac{\text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}}, \tag{6}$$

will not closely mimic the role of capital markets—shocks that were not insured ex-ante on capital markets will not be smoothed ex-post on credit markets.

which is the ordinary least squares estimate of the slope in the cross-sectional regression $\Delta \log(c^i + G^i)$ on $\Delta \log \text{GDP}^i$.

We turn to the predictions of the theory regarding the signs and magnitudes of these coefficients. If there is full risk sharing, that is, if equation (1) holds, then $\text{cov}\{\Delta \log(c^i + G^i), \Delta \log \text{GDP}^i\} = 0,$ and hence $\beta_u = 0.$ If full risk sharing is not achieved, then consumption in country i varies positively with idiosyncratic shocks to country i's output, and $\beta_u > 0.$ A cross-sectional regression of consumption on output, controlling for fluctuations in world consumption is, therefore, a test of full risk sharing.[10]

If full risk sharing is achieved through income insurance via factor income flows, GNI will satisfy equation (1). Then $\text{cov}\{\Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} = 0$ and hence, $\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} = \text{var}\{\Delta \log \text{GDP}^i\},$ implying $\beta_f = 1.$ Moreover, in this case, since consumers in each country consume their GNI, namely, $c^i = \text{GNI}^i,$ consumption satisfies equation (1) implying $\beta_u = 0.$[11]

Suppose that full risk sharing is not achieved through income insurance via factor income flows and capital depreciation, but is achieved through the combination of factor income flows, depreciation, and international transfers. Then DNI will satisfy equation (1) and, by analogous reasoning, $\beta_f + \beta_d + \beta_\tau = 1,$ and since consumers in each country will consume their DNI, $\beta_u = 0.$ Similarly, if the full risk sharing allocation is achieved through factor income flows, depreciation, international transfers, and saving, C+G will satisfy equation (1). Then, by analogous reasoning, $\beta_f + \beta_d + \beta_\tau + \beta_s = 1$ and $\beta_u = 0.$

β_u is the fraction of shocks to GDP that is not smoothed. The coefficients $\beta_f, \beta_d, \beta_\tau, \text{ and } \beta_s$ are interpreted as the fraction of shocks absorbed through factor income flows, depreciation, international transfers, and saving, respectively. If consumption satisfies equation (1), they sum to unity and $\beta_u = 0.$ If not, they sum to less than unity. In either case, they reflect the incremental amount of smoothing achieved through the various channels discussed above.

We not impose any restrictions on the sign of the β-coefficients. If a country that is hit by a positive shock has a smaller share of GDP allocated to, e.g., capital consumption, then depreciation provides cross-sectional dis-smoothing. Similarly, if taxes increase or decrease less than proportionately with output, they provide dis-smoothing.

The role of Government, Personal, and Corporate Saving in Consumption Smoothing

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[10] This is precisely the test suggested by Mace (1991) and Townsend (1994). They test for full risk sharing by running cross-sectional (or panel) regressions of consumption on income, controlling for aggregate movements in income and consumption. Cochrane's (1991) test is very similar.

[11]

[11] If full risk sharing is not achieved through income insurance via factor income flows, then $\text{cov}\{\Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} > 0$ and hence, $\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} < \text{var}\{\Delta \log \text{GDP}^i\},$ implying $\beta_f < 1.$

Net national saving consists of three components: personal, corporate, and government saving. This role of each of these components in consumption smooth can help shed light on institutional barriers to consumption smoothing—in particular whether the 1992 Maastricht requirements regarding government debt, and the subsequent Stability and Growth Pact, have been impediments to risk sharing.[12]

The corporate sector may contribute to income insurance if it adjusts patterns of earnings retention so that a larger share of profits is distributed to shareholders during recessions.[13]

Individuals can smooth consumption through personal saving by borrowing and lending. The ability of individuals to smooth their consumption through cross-country borrowing and lending depends on whether the banking system, and credit markets in general, are sufficiently integrated internationally—otherwise, say, an increase in the demand for loans may increase the domestic interest rate leading to less borrowing. Ostergaard, Sørensen, and Yosha (2001) and Sørensen and Yosha (2000) find that aggregate state-level consumption and, therefore, savings patterns are closer to the prediction of the Permanent Income Model than aggregate country-level consumption. Whether this implies more or less risk sharing at the country-level in our metric depends on the time-series properties of shocks to disposable income.

Allocation of Saving

The amount of consumption smoothing achieved through saving can also be decomposed according to the "destination" of savings, namely, domestic physical investment versus investment abroad. Net investment abroad equals the current account surplus CA and S = I + CA, where "I" denotes net domestic physical investment. If higher saving in a country in a particular year is mainly reflected in higher investment in that country in the same year, this would indicate that international investment patterns do not respond strongly to shocks and, therefore, do not contribute to cross-country consumption smoothing. The well-known paper by Feldstein and Horioka (1982) raises the question of why saving and investment at the country-level are so highly correlated. While there may be conditions where this is an optimal outcome, a high correlation between investment and saving is typically considered a symptom of lack of international financial integration.

In theoretical work risk sharing is typically modeled as the shipping of goods abroad in good times.[14] We denote net export by $X^i - M^i$ and examine if $GDP^i - X^i + M^i$ is smoothed relative to output (after controlling for the aggregate).

Estimation
Estimating channels of risk sharing

At the practical level, the following (panel) equations are estimated:

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[12] Gali and Perotti (2003) find that the Maastricht rules in practice have not limited the ability of fiscal policy in the EMU to be counter-cyclical. However, their metric is somewhat different from our risk sharing measure.
[13] This is consistent with the standard textbook view that corporations smooth dividend payout ratios, adjusting them only in response to shifts in long-run sustainable earnings; see, e.g., Brealey and Myers (1991, Chapter 16).
[14] See Heathcote and Perri (2004) for an example.

$$\Delta \log \text{GDP}_t^i - \Delta \log \text{GNI}_t^i = \nu_{f,t} + \beta_f \; \Delta \log \text{GDP}_t^i + \epsilon_{f,t}^i \,,$$

$$\Delta \log \text{GNI}_t^i - \Delta \log \text{NI}_t^i = \nu_{d,t} + \beta_d \; \Delta \log \text{GDP}_t^i + \epsilon_{d,t}^i \,,$$

$$\Delta \log \text{NI}_t^i - \Delta \log \text{DNI}_t^i = \nu_{\tau,t} + \beta_\tau \; \Delta \log \text{GDP}_t^i + \epsilon_{\tau,t}^i \,, \qquad (7)$$

$$\Delta \log \text{DNI}_t^i - \Delta \log(\text{C}_t^i + \text{G}_t^i) = \nu_{s,t} + \beta_s \; \Delta \log \text{GDP}_t^i + \epsilon_{s,t}^i \,,$$

$$\Delta \log(\text{C}_t^i + \text{G}_t^i) = \nu_{u,t} + \beta_u \; \Delta \log \text{GDP}_t^i + \epsilon_{u,t}^i \,,$$

where $\_{\cdot,t}$ are time fixed effects. The time fixed effects capture year specific impacts on growth rates, most notably the impact of the growth in aggregate EMU (or OECD) output Furthermore, with time fixed effects the _-coefficients are weighted averages of the year-by year cross-sectional regressions. To take into account autocorrelation in the residuals we assume that the error terms in each equation and in each country follow an AR(1) process. Since the samples are short, we assume that the autocorrelation parameter is identical across countries and equations. We further allow for state specific variances of the error terms. In practice, we estimate the system in (7) by a two step Generalized Least Squares (GLS) procedure. Unless we explicitly say otherwise, we use differenced data at the yearly frequency. Because our method is based on panel estimation with time fixed effects, it yields fully consistent estimates even if there are worldwide taste shocks.

Estimating economic determinants of risk sharing

Consider, for example, the estimated income smoothing from factor income flows, β_f. M´elitz and Zumer (1999) impose structure on β_f so that $\beta_f = \beta_{f0} + \beta_{f1} \gamma_i$, where γ_i is an "interaction" variable that affects the amount of smoothing that country i obtains. Sørensen, Wu, Yosha, and Zhu extended this method by allowing β_f to change over time, as follows:

$$\beta_f = \beta_{f0} + \beta_{f1}(t - \bar{t}) + \beta_{f2}(X_{it} - \overline{X}), \qquad (8)$$

where Xit is a variable that potentially may impact on risk sharing. We subtract the mean of the "interaction variables" in order to leave the interpretation of β_{f0} as the average amount of income smoothing. We experiment with variables such as average size of country i which varies across countries but not over time, and with variables such as the U.S. interest rate which varies over time but not across countries.

In practice, we estimate the time varying amount of income smoothing by running the regression

$$\Delta \log \text{GDP}_t^i - \Delta \log \text{GNI}_t^i = \nu_{f,t} + \beta_{f0} \; \Delta \log \text{GDP}_t^i + \beta_{f1} \; \Delta \log \text{GDP}_t^i * (t - \bar{t})$$

$$+ \beta_{f2} \; \Delta \log \text{GDP}_t^i * (X_{it} - \overline{X}) + \epsilon_{f,t}^i \,,$$

possibly including further interaction variables.

We, similarly, examine if the amount of consumption smoothing from saving, β_s, varies with interaction variables.

Results
Data

The data are from the OECD National Accounts, Main Aggregates (Volume I) and Detailed Tables (Volume II), various issues, covering the period 1970–2003. The OECD countries in our sample consist of all 2005 members except Luxembourg (very small and atypical), Iceland (incomplete data), and the less developed countries: Czech Republic, Hungary, Korea, Mexico, Poland, Slovakia, and Turkey. In order to compare the results, we use three subsets of the OECD members in the various regressions. The EMU countries with the exception of Luxembourg.[15] The EU denotes all the 2003 EU member countries, excluding Luxembourg.[16] OECD–EU denotes the OECD members in our sample excluding the 14 member countries of the EU.[17]

Income insurance and consumption smoothing among EMU and OECD countries

We begin by presenting our estimates of the fraction of shocks to GDP absorbed at the various levels of smoothing for EMU, EU, and OECD countries.

In Table 1 we display the estimated percentages of shocks to GDP smoothed through each channel, among EMU, EU, Non-EU developed OECD ("OECD") countries, for the period 1970–2003. Conceptually, the coefficients add up to 100 percent but we choose not to impose this constraint.

From the first line in Table 1 it is immediately apparent that the contribution of crosscountry factor income flows to cross-country risk sharing, among EMU as well as OECD countries, has not been significantly different from zero for our sample period. This is the result that SY found for the period previous to 1990. Of course, it is well known that cross-country assets holdings were very small during that period as documented by French and Poterba (1991) and Tesar and Werner (1995), so this result is no big surprise. Note that factor income flows are almost solely dividend, interest, and other earnings accruing to capital. Income of, say, a U.S. resident working in the U.K. is also part of factor income, but earnings of, say, a Turkish citizen who is a resident of Germany is part of German GNI and doesn't enter factor income flows.

Depreciation contributed negatively to income smoothing. This variable isn't very interesting because depreciation is a function of past investment and, besides, is mainly imputed. However, the negative sign is intuitive because when output goes up depreciation typically doesn't move with output and therefore a larger share of output is available for income and consumption. We will not comment on this channel much.

During the 1971–2003 sample period transfers did not contribute to risk sharing. Transfers include official transfers, such as contributions to the EU budget and foreign aid, and workers remittances which, on average during this period, were fairly small.

The fourth line in Table 1 indicates that the bulk of the consumption smoothing of EU and OECD countries is achieved via saving. Such smoothing need not involve actual cross-

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[15] The EMU consists of Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain.
[16] The EU consists of the EMU countries plus Denmark, Sweden and the U.K.
[17] OECD–EU consists of Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States.

border flows of funds but can be reflected in domestic fixed or inventory investment. The point estimate for consumption smoothing through national saving is higher for the OECD countries but the difference is not statistically significant. Overall, two-thirds of output shocks were not smoothed during this period. SY found virtually identical results for the period 1966–1980 and for the OECD (including EU) in the 1980s. For the core EU countries they found lower consumption smoothing from saving in the 1980s. We will examine how our results vary by subperiods and in particular if risk sharing has increased in the EMU in recent periods.

Table 1

Income and Consumption Smoothing (percent) by National Accounts Categories

	EMU 1971-2003	EU 1971-2003	(OECD–EU) 1971-2003
Factor Income (β_f)	2 (1)	0 (1)	−1 (1)
Depreciation (β_d)	−5 (1)	−5 (1)	−7 (2)
Transfers (β_τ)	1 (1)	1 (1)	0 (0)
Saving (β_s)	41 (4)	36 (3)	53 (4)
Not Smoothed (β_u)	61 (3)	68 (3)	56 (4)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed.

SY stated: "..the large amount of consumption smoothing achieved in the European Community via government borrowing may not be sustainable in an EMU where fiscal coordination must be maintained. Until private capital and credit markets develop, there may be a need for a greater insurance role of European Community institutions." To throw light over this issue Table 2 repeats the exercise of Table 1 for the period 1999—2003 after the introduction of the Euro. Two things have changed noticeably: First, factor income now smooth 11 percent of GDP shocks in the EMU and still nothing in the OECD and, second, consumption smoothing through national savings has decreased steeply in the EMU and increased in the OECD with the net result being that 72 percent of shocks to GDP in the OECD are smoothed while only 34 percent are smoothed in the EMU. Also, transfers contribute modestly, but significantly, to income smoothing in the EMU. We do not have enough observations to make clear statements of the difference between the EMU and the

three EU members that are not member of the EMU.[18] However, including the non-EMU EU countries weakens the effect of factor income smoothing lending at least weak support to the notion that the common currency is helping this channel of risk sharing.

Table 2

Income and Consumption Smoothing (percent) by National Accounts Categories

	EMU 1999-2003	EU 1999-2003	OECD–EU 1999-2003
Factor Income (β_f)	11 (4)	6 (3)	−1 (3)
Depreciation (β_d)	8 (3)	7 (3)	−7 (3)
Transfers (β_τ)	3 (1)	3 (2)	−1 (1)
Saving (β_s)	12 (8)	12 (7)	81 (9)
Not Smoothed (β_u)	66 (6)	73 (6)	28 (4)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors are in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed.

Did factor income smoothing increase slowly over the full sample or steeply after the introduction of the Euro? Table 3 addresses this question. The answer is: factor income smoothing rose steeply after the introduction of the Euro. The table also shows that factor income smoothing robustly has been zero before 1999—the one significant number for the 1970s for the EMU is the lone significant number before that period. This is consistent with the large decline in home bias in asset holdings documented by, for example, Sørensen, Wu, Yosha, and Zu (2005). However, foreign asset holdings need to be very large in order to provide significant smoothing. To fix thoughts, think of the case where all capital in a country

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[18] Particularly since a country like Denmark ties its currency very tightly to the Euro so that it isn't really obvious how it would be better classified

is owned by foreigners and residents of the country own foreign assets in the same amount. The capital output ratio is often assumed to be around three so, roughly, this would be a case where the level foreign asset holdings is three times GDP. Assume, as is also often done, that one third of GDP accrues to capital. Then one would expect 33 percent of output shocks to be smoothed by factor income. Consider how our measure works in a 1-period case where GDP in a country starts at GDP0 and GDP1 = 1.1 _ GDP0. If world per capita GDP in both periods is fixed at GDP0 then GNI1 = .33*GDP0+0.66*GDP1 = GDP0 + 0.66 * (GDP1 − GDP0). We have Δlog GDP1 ≈0.66 * Δlog GDP1 which show that 33 percent of the output shock is smoothed by factor income.

Table 3

Factor Income Smoothing (percent) among OECD Countries

	EMU	EU	OECD–EU
1971-1980	3	1	−2
	(1)	(1)	(1)
1981-1990	1	−2	−2
	(2)	(2)	(2)
1991-1999	3	0	−1
	(3)	(2)	(3)
1999-2003	11	6	−1
	(4)	(3)	(2)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$.

In the example, there are really two reasons why factor income smooth output: First, when output goes up factor income paid to other countries increases—proportionally to output in our simple example and, secondly, factor income received does not move oneto- one with output. In reality, many other patterns can occur and it is possible for factor income to even dis-smooth. An example would be a country that pays interest on debt and pays a very large risk premium on bonds issued. In the face of high domestic growth the risk premium on debt may decline and interest payment to foreigners may decline. The high growth is overall a good situation for the country, but it does result in negative insurance. Of course, the reverse situation when output falls and interest paid goes up is particularly onerous. A more likely

situation for OECD countries may be one where a country has a large net debt position and the world interest rate falls, to take a concrete example, leading to lower debt payments. If creditor countries happen to grow fast during such a period while debtor countries grow slowly debt holdings could contribute negatively to risk sharing.

Table 4 examines the contributions to risk sharing from factor income paid and factor income received. We see some negative income smoothing from outgoing factor income in the 1980s for EMU and EU countries and, not statistically significant, for the OECD. We suspect this is related to the high interest rates during this period. During the 1990s factor income received provided strong negative risk sharing in the EMU and the EU while factor income paid contributed roughly the same amount but positively. Finally, since the adoption of the Euro we see strong risk sharing benefits from incoming and outgoing factor income in the Euro countries with no significant coefficients for the other country groups. (The point estimates are not statistically significant but we know from Table 2 that the combined impact is strongly significant.) This is suggestive of deeper capital market integration taking place among EMU countries, but the sample is still too short for firm conclusions.

Table 4

Income Smoothing (percent) from Incoming and Outgoing Payments of International Factor Income

	EMU incoming	EMU outgoing	EU incoming	EU outgoing	OECD–EU incoming	OECD–EU outgoing
1971-1980	3 (1)	0 (1)	3 (1)	−1 (1)	0 (1)	−2 (1)
1981-1990	2 (2)	−5 (3)	2 (2)	−6 (3)	−1 (2)	−3 (2)
1991-1999	−9 (2)	9 (5)	−8 (2)	5 (3)	2 (2)	−2 (2)
1999-2003	7 (5)	8 (8)	−2 (3)	3 (6)	0 (3)	−1 (2)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. The table shows, for incoming factor income, the coefficient β_{f+}, the GLS estimate of the slope in the regression of $\Delta \log \mathrm{GDP}^i - \Delta \log(\mathrm{GDP}^i + $ international factor income received) on $\Delta \log \mathrm{GDP}^i$. For outgoing factor income, the coefficient β_{f-}, the GLS estimate of the slope in the regression of $\Delta \log \mathrm{GDP}^i - \Delta \log(\mathrm{GDP}^i - $ international factor income paid) on $\Delta \log \mathrm{GDP}^i$.

Table 5 displays a similar breakdown by subperiods for transfers. Transfers contribute positively to income smoothing in the EU area since 1980. Likely from the combined impact of EU official transfers and remittances. The magnitude is not large, about 5 percent in the 1980s and 1990s and a bit smaller since 1999 but the impact is statistically significant and appears robust. For no subperiod do transfers smooth income in the OECD outside of the EU.

Table 5

International Transfers Smoothing among OECD Countries

	EMU	EU	OECD–EU
1971-1980	−3	−2	−1
	(1)	(1)	(1)
1981-1990	5	4	0
	(2)	(1)	(0)
1991-1999	6	4	0
	(2)	(2)	(1)
1999-2003	3	2	−1
	(1)	(1)	(1)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \mathrm{NI}^i - \Delta \log \mathrm{DNI}^i$ on $\Delta \log \mathrm{GDP}^i$.

Savings contribute little to consumption smoothing in the EMU since 1999. Is that a recent phenomenon? Table 6 addresses that issue. For all subperiods are the amount of consumption smoothing through saving smaller in the EMU and the EU. The numbers are never larger in the EU than in the EMU so the indication is that this may have more to do with EU institutions than with the common currency. The divergence since 1999 is striking. We examined if the high numbers for the OECD were due to an outlier like Norway, where the government saves large amounts of oil-revenues, but this is not the case.

Table 6

Total Savings Smoothing among OECD Countries

	EMU	EU	OECD–EU
1971-1980	53	53	62
	(6)	(5)	(7)
1981-1990	26	24	43
	(6)	(4)	(6)
1991-1999	41	34	47
	(7)	(6)	(9)
1999-2003	12	12	81
	(8)	(7)	(9)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Standard errors in brackets. The table shows β_s, the GLS estimate of the slope in the regression of $\Delta \log \mathrm{DNI}^i - \Delta \log \mathrm{CON}^i$ on $\Delta \log \mathrm{GDP}^i$.

Table 7 considers smoothing through government saving. The decline in smoothing from government saving since 1999 is very steep in the EMU and similarly when the whole EU is considered. In the OECD smoothing from government saving, on the contrary, increased steeply after 1999. Tables 8 and 9 consider smoothing from corporate and personal saving, respectively. There seem to be no time pattern in the smoothing from corporate saving. In the EMU and EU corporate saving smoothes consumption in most periods while it is insignificant in the OECD for all sub-periods. Private saving, examined in Table 8, has been dis-smoothing (counter-cyclical) in the EMU and EU until 1999 after which the effect is small and positive—statistically significant for the EMU. In the OECD the pattern is the opposite. It is intriguing that private saving seems to counteract the pattern in government saving.

Table 7

Smoothing via Government Saving among OECD Countries

	EMU	EU	OECD–EU
1987-1990	0	9	25
	(11)	(7)	(8)
1991-1995	46	36	50
	(9)	(8)	(3)
1996-2001	19	10	83
	(6)	(5)	(7)

Notes. EMU: Austria, Belgium, Finland ,France, Germany, Greece, Ireland,Italy, Nethe lands Spain, and Portugal. EU: Austria,Belgium, Denmark, Finland, France, Germany Greece,Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Aus tralia, Canada, US, Norway and after 1990 Japan. Standard errors in brackets. The tabl shows the GLS estimate of the slope in the regression of $\Delta \log \mathrm{DNI}^i - \Delta \log(\mathrm{DNI}^i -$ net gov ernment saving) on $\Delta \log \mathrm{GDP}^i$.

Table 8

Smoothing via Corporate Saving among OECD Countries

	EMU	EU	OECD–EU
1987-1990	8	10	6
	(7)	(5)	(10)
1991-1995	4	7	−11
	(9)	(8)	(11)
1996-2001	9	12	−4
	(1)	(3)	(4)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, US, Norway and after 1990 Japan. Standard errors in brackets. The table shows the GLS estimate of the slope in the regression of $\Delta \log \mathrm{DNI}^i - \Delta \log(\mathrm{DNI}^i -$ corporate saving) on $\Delta \log \mathrm{GDP}^i$.

Table 9

Smoothing via Private Saving among OECD Countries

	EMU	EU	OECD–EU
1987-1990	−15	−17	12
	(4)	(5)	(11)
1991-1995	−17	−18	21
	(6)	(6)	(8)
1996-2001	6	1	-5
	(2)	(6)	(7)

Notes. EMU: Austria, Belgium, Finland ,France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, US, Norway and after 1990 Japan. Standard errors in brackets. The table shows the GLS estimate of the slope in the regression of $\Delta \log \mathrm{DNI}^i - \Delta \log(\mathrm{DNI}^i -$ private saving) on $\Delta \log \mathrm{GDP}^i$.

In Figures 1–4 we illustrate the results discussed so far in graphical form. Figure 1 shows the total amount smoothed and the contribution from saving. While there is some noise the pattern of increasing contributions from saving in the OECD is fairly clear and the decreasing contribution from saving in the EMU is particularly clear. In the OECD the combined contribution from other channels of smoothing is negative in all years while in the EMU this is, fortunately, not the case: as the contribution from saving has declined to near zero by the new century other channels of smoothing kept the overall amount of risk sharing at about 40 percent. Figure 2 displays the contributions from transfers and factor income. Factor income smoothing seems to have a tendency to dis-smooth for most of the period until the recent period. Smoothing from transfers were initially negative but turned positive in the EMU around 1980 with a slow decline since the mid 1980s. In the OECD transfers do not contribute either way. Figure 3 shows the contributions from components of saving. In the OECD government saving provided the bulk of the smoothing—in particular since 1992— although corporate saving started to contribute noticeably in the late 1992. In the EMU corporate saving is now more important for smoothing the government saving. Personal saving used to be counter-cyclical leading to strong dis-smoothing of consumption in the 1980s, although the role of private saving now is minor as it is in the OECD. In Figure 4 we display the simple ratio of the savings components to GDP. The ratio of government saving to GDP takes big dips in the OECD during the recessions in the early 1980s, the early 1990s, and early in the present century which is what our regressions correctly pick up. In the EMU this pattern is much less strong—it seems that for some reason EMU governments ran up large deficits until the mid-1990s after which they increased saving, presumably to meet the Maastricht criteria. Overall, we are left wondering if this is particularly optimal pattern of

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saving although we of course do not evaluate the myriad of non-risk sharing consideration that may have motivated this. Counter-cyclical behavior of corporate saving is visible since 1990 in the EMU.

We turn to the decomposition of smoothing via saving into smoothing via domestic net physical investment and the current account. We also consider net exports. We measure the fraction of shocks smoothed via domestic net investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$. Similarly, we measure the fraction of shocks smoothed via the current account surplus ("investment abroad") as the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$. Due to non-linearity (and to the way we correct for heteroskedasticity and autocorrelation) the smoothing from the current account and from investment will not add up to the smoothing from saving but conceptually it is a decomposition of this smoothing.

The results, displayed in Table 10, for the full sample, indicate that the bulk of smoothing is achieved via domestic investment, not the current account and not through net exports. The finding that shocks to output are smoothed via domestic net physical investment is consistent with the procyclical behavior of investment in aggregate US data; see Blanchard and Fischer (1989).

Table 10

Smoothing through Domestic Net Physical Investment, Current Account and via Net Exports among OECD Countries for years 1971-2003

	EMU	EU	OECD–EU
Net Investment	43	37	33
	(4)	(4)	(6)
Current account	−10	−7	3
	(3)	(3)	(4)
Net Exports	−3	−4	3
	(3)	(2)	(3)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$. Similarly, the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via investment abroad and the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via net exports.

Table 11 considers the smoothing from domestic investment by subperiods. In the 1970s investment contributed highly to income smoothing while the impact declined in the

1980s and 1990s and for the 1999-2003 period the impact is only 11 percent in the EMU and insignificant in the EU. In the OECD the decline is smaller and net investment still smooth 25 percent of shocks. This may be a reflection of lack of capital market integration "forcing" countries to invest savings domestically.

Table 11 Net Investment Smoothing among OECD Countries

	EMU	EU	OECD–EU
1971-1980	61	65	60
	(9)	(7)	(12)
1981-1990	39	34	30
	(7)	(6)	(10)
1991-1999	35	31	18
	(4)	(4)	(7)
1999-2003	11	6	25
	(5)	(4)	(10)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks are absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$.

Table 12 considers the role of the current account. Surprisingly, the current account contributed negatively, or not at all, before 1999. In the period after 1999 there is no effect in the EMU (reflecting that overall saving is not contributing to consumption smoothing) but for the OECD this channel contributes 35 percent to consumption smoothing. This result indicates that the Feldstein-Horioka "puzzle" is becoming less serious as countries invest their saving world-wide.[19]

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[19] Blanchard and Giavazzi (2002) argue that the Feldstein-Horioka puzzle is a thing of the past in the Euro area.

Table 12

Current Account Smoothing among OECD Countries

	EMU	EU	OECD–EU
1971-1980	−14	−7	3
	(6)	(3)	(4)
1981-1990	−13	−15	−6
	(7)	(5)	(6)
1991-1999	1	0	4
	(5)	(4)	(5)
1999-2003	−5	−6	35
	(5)	(2)	(11)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway, and Switzerland. Percentages of shocks are absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via the current account surplus.

We use a similar regression to see if net exports smooth income: the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks. The results—see Table 13—show that until very recently, net exports played no role in consumption smoothing. However, for the OECD countries there has been a large contribution to consumption smoothing through net exports since 1999.

Table 13

Net Export Smoothing among OECD Countries

	EMU	EU	OECD–EU
1971-1980	−4	−8	4
	(5)	(4)	(9)
1981-1990	−8	−7	1
	(6)	(5)	(5)
1991-1999	2	2	−3
	(4)	(3)	(5)
1999-2003	5	1	23
	(5)	(2)	(11)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway and, Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via net exports.

Table 14 examines if the results are different when the time-period considered is three years, rather than one. SY found that consumption smoothing was significantly lower at the three-year frequency, in particular due to smoothing through corporate saving being of short duration.[20] Comparing the results with those of Table 1, we see slightly less risk sharing at the longer horizon but not significantly less so.[21]

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[20] Becker and Hoffmann (2006) perform a more systematic examination of risk sharing at different frequncies.
[21] This sample includes only one observation per country so the results are imprecisely estimated as indicated by the large standard error. Clearly more observations are needed to corroborate that this result reflects more than transitory conditions.

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Table 14

Income and Consumption Smoothing (percent) by National Accounts Categories.

Three-Year Frequency of Observation.

	EMU	EU	(OECD–EU)
	1971-2003	1971-2003	1971-2003
Factor Income (β_f)	1	-2	-3
	(2)	(2)	(2)
Depreciation (β_d)	−4	−4	−6
	(2)	(2)	(2)
Transfers (β_τ)	0	1	0
	(2)	(1)	(1)
Saving (β_s)	34	31	48
	(5)	(4)	(7)
Not Smoothed (β_u)	69	74	61
	(5)	(4)	(6)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway and, Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed. "ΔX_t" here refers to $X_t - X_{t-3}$ for any variable X. Non-overlapping observations.

ASY and SY found evidence that smoothing from cross-ownership of assets is much more "permanent" than smoothing from saving. In Table 15 we examine smoothing from factor income in the upper panel and from saving in the lower panel by sub-periods. In the EMU we find a very large smoothing effect from factor income for 2000–2002. Due to the short sample this is only suggestive but the result is accordance with our prior expectations. On the other hand, it is

puzzling why factor income flows provided negative risk sharing at this frequency for the OECD countries.[22]

Table 15

Factor Income and Total Saving Smoothing among OECD Countries. Three-Year

Frequency of Observation.

Panel A: Factor Income

	EMU	EU	OECD–EU
1982-1990	−7	−5	−2
	(4)	(3)	(4)
1991-1999	5	1	−14
	(4)	(4)	(6)
2000-2002	30	18	−11
	(5)	(5)	(3)

Panel B: Total Saving

	EMU	EU	OECD–EU
1982-1990	42	30	27
	(9)	(8)	(11)
1991-1999	36	36	58
	(6)	(7)	(17)
2000-2002	−12	−10	89
	(2)	(1)	(6)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and UK. OECD–EU: Australia, Canada, Japan, New Zealand, US, Norway and, Switzerland. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. Factor income smoothing is the GLS estimate of the slope in the regression of $\Delta \log \mathrm{GDP}^i - \Delta \log \mathrm{GNI}^i$ on $\Delta \log \mathrm{GDP}^i$, similarly the total saving smoothing is calculated by regressing $\Delta \log \mathrm{DNI}^i - \Delta \log \mathrm{CON}^i$ on $\Delta \log \mathrm{GDP}^i$. "$\Delta X_t$" here refers to $X_t - X_{t-3}$ for any variable X. Non-overlapping observations.

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[22] These results are mainly suggestive and we choose to end the sample in 2002 because this break-up into sub-periods gives the strongest contrast between the 1990s and the 2000s.

Tables 16–17 and Tables 18–19 study if income smoothing from factor income and consumption smoothing, respectively, vary systematically with time, interest rates etc. Sørensen, Wu, Yosha, and Zhu (2005) showed that risk sharing increase with holdings of foreign assets and we do not revisit that issue. Instead we follow M´elitz and Zumer (1999) and examine if smaller countries obtain more risk sharing and if risk sharing depends on the world (U.S.) interest rate. A country with large net holdings of bonds will receive a larger amount of income from these when interest rates are high, typically leading to higher income smoothing for such countries. We further examine if risk sharing is correlated with the average output of countries, with the aggregate business cycle (the output of our total sample filtered through a Hodrick-Prescott filter), and with the country level interest rate. We show results for an early (1971–1987) and a late (1988–2003) sample. We also include a dummy variable for EMU countries—this allows to examine if the different results found for the EMU remains when we allow explanatory variables to determine the amount of risk sharing.

For income smoothing from international factor income we find that richer (higher output) countries obtained significantly less income smoothing in the early part of the sample. This result also hold for the later sample (Table 17) but no longer with statistical significance. The world interest rate seems to have no effect, while the trend is insignificant but negative in the early sample and positive and significant in the later sample—this isn't surprising given our earlier results. Our other interaction variables are not significant in the early sample but for the later sample the EMU dummy is (near) significant at the standard five percent level.

For consumption smoothing through saving we find in Table 18 that richer countries tended to obtain more consumption smoothing but the result isn't statistically significant. The world interest rate had a significant negative impact on consumption smoothing while the trend was clearly positive. EMU countries obtained dramatically less consumption smoothing as did large countries. In the later sample—shown in the Table 19—these results still obtain, indicating that these patterns are robust. In the later sample we further find that consumption smoothing through saving is positively—and significantly—correlated with the country-level interest rate.

Overall, our results show that the ability to smooth consumption internationally is strongly dependent on country characteristics such as wealth and size and on international conditions such a world interest rates. A deeper study of this is far beyond the present paper but these results serve to demonstrate that the different patterns of risk sharing found for the EMU countries are not simply capturing variables such as size and wealth that were left out in the earlier tables.

4 Concluding Remarks

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Table 16

Factor Income Smoothing (percent) by National Accounts Categories with the Interaction Variables for period 1971-1987 for the OECD

$\Delta \log$ GDP	0	0	−1	0	0	0	0	0	0
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
$\Delta \log$ GDP*GDP^{ave}	−11								−14
	(5)								(6)
$\Delta \log$ GDP*RINT^{w}		0							0
		(1)							(0)
$\Delta \log$ GDP*TREND^{agg}			−3						−4
			(2)						(3)
$\Delta \log$ GDP*EXCH^{i}				3					3
				(3)					(3)
$\Delta \log$ GDP*CYCLE^{agg}					1				1
					(1)				(1)
$\Delta \log$ GDP*EMU						−4			−3
						(4)			(4)
$\Delta \log$ GDP*RINT^{i}							1		1
							(0)		(0)
$\Delta \log$ GDP*POP^{ave}								3	1
								(2)	(3)

Notes: The dependent variable is $\Delta \log$ GDP$^{i} - \Delta \log$ GNI^{i}. GDP^{ave} refers to real gdp per capita averaged over the sample for each country. RINT^{w} is the world real interest rate. EXCH is the real exchange rate relative to US. CYCLE^{agg} is HP-filtered real aggregate per capital of the countries in the sample. EMU is a dummy variable for members of the EMU. RINT is to the real interest rate (the nominal interest rate minus the rate of inflation). POP^{ave} is the population averaged across the sample for each country. See text for the sample of countries included.

Table 17

Factor Income Smoothing (percent) by National Accounts Categories with the Interaction Variables for period of 1988-2003 for the OECD

$\Delta \log$ GDP	-1	-2	-1	-2	-1	-2	-1	-2	-2
	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(2)	(2)
$\Delta \log$ GDP*GDP^{ave}	-10								-9
	(7)								(7)
$\Delta \log$ GDP*RINT^{w}		1							1
		(1)							(1)
$\Delta \log$ GDP*TREND^{agg}			6						10
			(1)						(5)
$\Delta \log$ GDP*EXCH^{i}				-11					7
				(10)					(4)
$\Delta \log$ GDP*CYCLE^{agg}					-1				1
					(0)				(1)
$\Delta \log$ GDP*EMU						8			9
						(4)			(5)
$\Delta \log$ GDP*RINT^{i}							0		0
							(1)		(1)
$\Delta \log$ GDP*POP^{ave}								3	4
								(2)	(3)

Notes: The dependent variable is $\Delta \log$ GDP$^{i} - \Delta \log$ GNI^{i}. GDP^{ave} refers to real gdp per capita averaged over the sample for each country. RINT^{w} is the world real interest rate. EXCH is the real exchange rate relative to US. CYCLE^{agg} is HP-filtered real aggregate per capital of the countries in the sample. EMU is a dummy variable for members of the EMU. RINT is to the real interest rate (the nominal interest rate minus the rate of inflation). POP^{ave} is the population averaged across the sample for each country. See text for the sample of countries included.

Table 18

Saving Smoothing (percent) by National Accounts Categories with the Interaction

Variables for period 1971-1987 for the OECD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta \log$ GDP	56	57	55	56	55	57	56	55	62
	(3)	(4)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
$\Delta \log$ GDP*GDP^{ave}	34								35
	(28)								(28)
$\Delta \log$ GDP*RINT^{w}		−2							−5
		(1)							(2)
$\Delta \log$ GDP*TREND^{agg}			1						20
			(7)						(11)
$\Delta \log$ GDP*EXCH^{i}				−13					−3
				(11)					(11)
$\Delta \log$ GDP*CYCLE^{agg}					−1				0
					(2)				(2)
$\Delta \log$ GDP*EMU						−34			−35
						(15)			(14)
$\Delta \log$ GDP*RINT^{i}							0		0
							(1)		(1)
$\Delta \log$ GDP*POP^{ave}								−20	−18
								(9)	(10)

Notes: The dependent variable is $\Delta \log$ GDP^{i} − $\Delta \log$ GNI^{i}. GDP^{ave} refers to real gdp per capita averaged over the sample for each country. RINT^{w} is the world real interest rate. EXCH is the real exchange rate relative to US. CYCLE^{agg} is HP-filtered real aggregate per capital of the countries in the sample. EMU is a dummy variable for members of the EMU. RINT is to the real interest rate (the nominal interest rate minus the rate of inflation). POP^{ave} is the population averaged across the sample for each country. See text for the sample of countries included.

Table 19

Saving Smoothing (percent) by National Accounts Categories with the Interaction Variables for period 1988-2003 for the OECD

$\Delta \log$ GDP	65	74	70	67	68	70	62	64	64
	(3)	(4)	(3)	(3)	(4)	(3)	(3)	(3)	(4)
$\Delta \log$ GDP*GDP^{ave}	121								86
	(23)								(23)
$\Delta \log$ GDP*RINT^{w}		−5							−5
		(2)							(2)
$\Delta \log$ GDP*TREND^{agg}			17						38
			(7)						(12)
$\Delta \log$ GDP*EXCH^{i}				−14					−9
				(16)					(16)
$\Delta \log$ GDP*CYCLE^{agg}					−1				3
					(1)				(2)
$\Delta \log$ GDP*EMU						−45			−26
						(16)			(14)
$\Delta \log$ GDP*RINT^{i}							6		5
							(1)		(1)
$\Delta \log$ GDP*POP^{ave}								−32	−23
								(8)	(8)

Notes: The dependent variable is $\Delta \log$ GDP$^{i} - \Delta \log$ GNI^{i}. GDP^{ave} refers to real gdp per capita averaged over the sample for each country. RINT^{w} is the world real interest rate. EXCH is the real exchange rate relative to US. CYCLE^{agg} is HP-filtered real aggregate per capital of the countries in the sample. EMU is a dummy variable for members of the EMU. RINT is to the real interest rate (the nominal interest rate minus the rate of inflation). POP^{ave} is the population averaged across the sample for each country. See text for the sample of countries included.

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