

Trade Liberalization, Financial Development and Economic Growth in The Long Term: The Case of Turkey

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Abstract:

The determinants of economic growth have been a much debated theoretical issue in the literature, especially after the endogenous growth theory of the late 1980s. This new theory highlights the importance of economic policies that lead to an increasing rate of return. In particular, it is argued that human capital, trade liberalization and financial development may play very important roles in the determination of economic growth. This paper tries to empirically estimate the joint impacts of trade liberalization and financial development on economic growth for the period 1960-2004. Instead of using common proxies for the issue, principal components analysis is employed to develop better measures (indexes) for trade liberalization, financial development and the joint effects of both. The empirical results obtained from the Johansen co-integration procedure show that trade liberalization, financial development and the joint impacts of both positively contributed to economic growth in Turkey for the period 1963-2005.

Keywords: Trade liberalization, Financial development, Economic growth, Co-integration, Endogenous growth theory, Turkey.

JEL: C32, E44, F13, O11, O16.

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1. Introduction

The impact of financial and trade regimes on economic growth have been a hotly debated theoretical issue, particularly after the emergence of the endogenous (new) growth theory during the last two decades. Contrary to the neo-classical growth theory, the new growth theory implies that the economic policies followed in a country may have a significant impact on the long-term rate of economic growth. To this end, most developing countries that formerly followed restrictive economic policies have started liberalizing their trade and financial sectors in order to increase economic growth in the 1980s. The main argument for this policy change was that both trade and financial liberalization policies reduce inefficiency in the production process and positively influence economic growth.

Following this line of reasoning, Turkey, as a developing economy, has witnessed an unprecedented and staged reform attempt involving external (trade) and internal (financial) liberalization, especially after the 24 January Decisions following the economic crisis in 1980. In Turkey, economic liberalization in terms of trade and financial sector was at the heart of the stabilization programme

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employed in 1980 and constituted an integral part of the economic policies since then. The theoretical core of the economic reform programme is to provide efficiency in the allocation of scarce resources.

In the empirical literature, the impact of trade liberalization¹ and financial development² on economic growth has been separately examined for Turkey. However, there has been theoretical literature that highlights the joint impact of these issues on economic growth. The joint impact of both variables is initially highlighted in the Roubini and Sala-i Martin (1991) model, which has extended the Barro (1991) growth model by incorporating both factors. The inclusion of both trade and financial variables in the Barro (1991) model showed that financial and trade variables may play a very important role in economic growth. Recently, Blackburn and Hung (1998) have presented a theoretical analysis of the joint impact of both financial development and trade liberalisation on economic growth. Using endogenous growth theory, their model predicts that economic growth rates in the presence of financial intermediation tend to be higher than those under direct lending and borrowing. The model also predicts that both financial development and trade liberalization jointly facilitate the rate of economic growth by decreasing redundant research efforts and increasing markets for new products.

Therefore, this paper empirically examines the impacts of trade liberalization and financial liberalization and/or development on economic growth in Turkey by using a simple endogenous growth framework and by making use of new developments in time series techniques for the period 1963-2005. This paper is distinguished from the earlier existing literature in two aspects. First of all, this paper tries to assess the joint impact of trade liberalization and financial development on economic growth.

Second, there are different measures for trade liberalization and financial development in the literature and the existing studies employ only one of these proxies in their analysis. However, the trade and financial liberalization affect economic growth through different channels and each proxy captures a single aspect of the issue. In order to overcome this problem, three composite indexes, for trade liberalization, for financial development

and for a narrow sense economic liberalization, are constructed by applying principal components analysis.

The structure of this paper is as follows: the next section presents the theoretical linkages among trade liberalization, financial development and economic growth and introduces the aggregate production function to be estimated. Section three gives brief information about the Turkish economy, particularly highlighting the developments in trade and financial sector. In section four, the measures for trade liberalization and financial development are reviewed and three indexes are constructed by employing principal components analysis. In section five, the empirical results are presented using econometric techniques and the outcome of the long-term production function is interpreted in detail. The paper finishes with a conclusion.

2.Theoretical Framework: Trade Liberalization, Financial Development and Economic Growth

With the emergence of the endogenous growth theories in 1980s, the relationship between economic policy and growth became a highly debated issue. In the theoretical literature, discussions are focused on different channels through which economic policy affects economic growth. In this section, different models of growth will be discussed to provide a framework of thought that helps to understand the impacts of each link between policy and growth. In other words, each channel through which economic policy affects growth has different implications for growth in different models. There are two competing theoretical frameworks in the growth literature, namely neo-classical and endogenous growth theories. The main differences between them are whether the policy change has a long-term effect on the growth rate. On the one hand, the neo-classical theory argues that a policy change has no effect on long-term economic growth and, on the other hand, that endogenous growth theory shows a policy change in economy does matter.

The endogenous growth theory is a reaction to the traditional Neo-Classical growth models³, represented by, among others, Solow (1956). This new approach to growth theory has sought to supply the missing explanation of long-term growth. In essence, this approach provides a theory of technical progress, one of the central missing elements of the neo-classical model. In other words, endogenous growth theories seek to discover what lies behind the exogenous rate of technical progress and hence a country's growth rate. Endogenous growth theory recognizes that technological change occurs as a result of the efforts of profit-maximizing firms to invent new blueprints, and that technological progress is an endogenous outcome of economic activity.

1 The relationship between growth and trade liberalization is usually examined in the empirical literature in two different lines for Turkey: The first line of the existing empirical research tries to assess the impact of openness on economic growth (Conway, 1987; Greenaway and Sapsford, 1994, 1995; Ghatak, Milner and Utkulu, 1995; Subasat, 2002; Utkulu and Ozdemir, 2005; Hilmi and Safa, 2007). The second line of the empirical works examines the relationship between trade liberalization and the total factor productivity (Krueger and Tuncer, 1980, 1982; Nishimizu and Robinson, 1986; Foroutan, 1991; Ozmucur and Karatas, 1994; Filiztekin 2000).

2 With the emergence of financial liberalization hypothesis, the empirical studies tried to assess the impact of financial liberalization on economic growth by simple regressing growth rate on the real interest rate (Fry, 1978, 1979, 1980). Furthermore, the relationship between financial development and economic growth is analyzed in terms of causality issue in a bivariate model (Kar and Pentecost, 2000; Unalmis, 2002; Ozatay and Sak, 2002). In addition, Yeldan (1997), Lewis (1992) and Karabulut and Demiroz (2002) examined the impact of financial liberalization/development on economic growth in the framework of the CGE models. Finally, Guncavdi and Kucukciftci (2005) investigate the role of financial reforms on economic growth with a methodology based on the Leontief's input-output model and conclude that the production sector of the economy has increasingly become independent from the use of financial services produced by the banking system in the post-reform period.

3 For a recent empirical and theoretical review of the literature on growth, see Renelt (1991), Hermes (1994), Levine (1997, 2001), Thirlwall (2000), Favara (2003), Auerbach and Siddiki (2004), Subasat (2002), Winters (2004).

The crucial distinction between 'old' and 'new' growth theories is that the former utilizes the assumption that returns to the capital stock is diminishing, while the latter argues that returns to capital itself or, in a wider sense, to the stock of physical and human capital formation is constant or increasing (Sala-i Martin, 1990a). This then implies that those variables that lead to non-decreasing returns drive the growth rate. Numerous candidates have been recommended as the source of non-decreasing returns: particularly, the stock of human capital Lucas (1988); accumulated capital, Rebelo (1991); research and development, Romer (1986, 1990); or public infrastructure investment (Barro, 1991). Thus, endogenous growth models highlight sectors of the economy that influence the growth path of an economy. This can be simply shown in a Rebelo-type production function, known as the AK model. Most of the endogenous growth models can be viewed as extensions or micro-foundations of the AK model (Sala-i Martin, 1990b).

Rebelo (1991) formulated the simple form of the endogenous growth model, which has since been widely used in empirical analysis. The AK model takes its name from its production function. In its original form, the model setting involves dynamic maximization. In this section, we will make the further assumption of a constant savings rate. This assumption, however, does not change the main conclusions and intuitions of the model. In the AK model, the production function takes the following form:

$$Y_t = AK_t \quad (1)$$

where Y_t represents output, K_t is capital stock at time t and A is some positive constant. This formulation of the production function means that there are constant returns to capital accumulation. It is also important to note that A is equal to the return to investment in this model. As will be explained in the next section, trade policy primarily affects the rate of return of capital and hence growth. Therefore, A can be written as a function of trade policy (τ) as,

$$A = \theta_0 - \theta_1 \tau \quad (2)$$

Equation (2) indicates that the rate of return of capital is a negative function of trade policy.

The accumulation of capital is formulated as:

$$K_t = I_{t-1} + (1 - \delta)K_{t-1} \text{ and } I_t = sY_t \quad (3)$$

where s is the investment rate and δ is the depreciation rate. Both are assumed constants, and investment at time t (I_t) is equal to the savings in the economy. The special formulation of the production function in the AK model (equation 1) implies that the marginal product of each unit of capital is always equal to A . It does not decline as

the capital accumulates. This can be shown easily: after substituting the value of investment into equation (3) and then dividing both sides by K_{t-1} and taking the logarithm of both sides, the resulting equation will be:

$$\log\left(\frac{K_t}{K_{t-1}}\right) = \log[sA + (1 - \delta)] \quad (4)$$

For small values of s, A and δ and $sA > \delta$, equation (4) can be written as:

$$\Delta \log K_t = sA - \delta \quad (5)$$

This equation says that the rate of growth of capital stock is constant if tariff rates are constant. After taking the logarithm and derivative of the production function and substituting the value of the equation of motion of the capital from equation (5) and the value of return to capital from the equation (2), the long-term rate of growth of output can be written as follows:

$$\Delta \log Y_t = \Delta \log K_t = s\theta_0 - s\theta_1 \tau - \delta \quad (6)$$

From equation (6), it is obvious that the rate of growth of the economy is decreasing with tariff rates and increasing with saving rates. Hence, any economic policy that increases the return to investment will permanently increase the rate of growth of the economy. Almost all endogenous growth literature has concentrated on the determinants of the return to investment, A , and how policy change affects it (Sala-i-Martin, 1990a).

Equation (6) has two main implications in terms of economic policy change. Economic policies in the trade and financial sectors will have a long-term effect on economic growth. While trade policy affects the economic growth through the change on tariff rates, the saving rates are influenced by a well-functioning financial system.

The theoretical linkages among trade liberalization and financial liberalization and economic growth can be explained as follows. Trade policy in terms of tariff reduction or elimination of restrictions on trade might have impacts on the growth through several channels. If openness is to affect economic performance, it must have an intermediate effect on one or all of the following: (i) allocation of factors of production across sectors - the allocation effect (Young, 1991; Redding, 1997; Grossman and Helpman, 1992); (ii) openness will increase competition in the domestic economy and hence productivity - the import discipline hypothesis (Greenaway and Milner, 1993; Aghion, Dewatripont and Rey, 1997; Aghion, Harris and Vickers, 1997; Aghion and Howitt, 1996); (iii) openness enlarges the market for domestic producers, which they can take advantage of - the scale economies (Taylor, 1994; Grossman and Helpman, 1991); (iv) openness increases the number of inputs that have no domestic substitutes

and thus leads to a higher capacity for utilization and productivity - the availability of inputs (Nishimizu and Robinson, 1986; Quah and Rauch, 1990; Rivera-Batiz, and Romer, 1991; Grossman and Helpman, 1992); and, finally, (v) the flow of knowledge across sectors and countries - the spillover effect (Feder, 1982; Grossman and Helpman, 1992).

On the other hand, the role of financial sector in economic development has long been one of the hotly debated issues among economists (Schumpeter, 1911; Goldsmith, 1969; Patrick, 1966; McKinnon, 1973; Shaw, 1973). With the emergence of the endogenous growth theory, several studies have attempted to show how the operation and policies of the financial sector may affect the rate of economic growth (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991; King and Levine, 1993a, 1993b; Roubini and Sala-i Martin, 1992; Pagano, 1993; Leigh, 1996; Demetriades and Hussein, 1996; Arestis, 2005; Siddiki, 2002; Auerbach and Siddiki, 2004; Arestis, 2005; Liang and Teng, 2006). Finance can influence growth in an endogenous growth model through increasing the savings rate (Bencivenga and Smith, 1991), by increasing the returns on investment (Greenwood and Jovanovic, 1990), and by increasing human capital accumulation. From a macroeconomic or aggregate production function point of view, all this means that economies that are developed more financially will be able to transform a given amount of inputs, K , into larger amount of output, Y . This is why the production function is an increasing function of the financial development of the economy (Roubini and Sala-i Martin, 1992).

3. A Brief Review of Turkish Economy

3.1. Macroeconomic Developments

It is very common to examine macroeconomic development in the Turkish economy under three sub-periods, 1923-1960, 1960-1980, 1980 and after, distinguished not only by different structural conditions, but also by the government's response to those conditions. There was heavy state intervention formulated as "etatism" before 1960 (Okyar, 1965). Etatism, an economic policy excessively controlled by the State, became unpopular and heavily criticized among Turkish academics and businessmen. With the changes in the political structure in terms of the multi-party system, there was a policy change towards liberalization in the period 1950-53. However, with the deterioration of macroeconomic structure, the etatist economic policies were re-initiated after attempts at policy change.

After the 1960 military coup, Turkey entered into a period of development plans. In September 1960, the State Planning Organisation (SPO) was established to study the Turkish economy and to propose and enforce a long-

term economic development plan. This proposal was for three five-year-plans, the first of which began in 1963. The economic development plans were aimed at producing a well-balanced economy with progress in agriculture and industry, thereby making the most of the available resources in the Turkish economy. The main features of this period are that the economic policies carried out within the development plans were characterized as interventionist and protectionist. Accordingly, policies were mainly designed to protect domestic industry from foreign competition and to increase the government control over the allocation of resources and production of goods. These economic policies implemented in the early 1960s were pursued for about twenty years, until 1980, when the Turkish economy found itself in a major crisis.

In 1980, a new stabilization policy was accepted and the etatism and import substitution policies were switched to an export-oriented industrialization policy based on a market mechanism. The policy package put into effect in 1980 and reinforced in the following years was more than just a stabilization and adjustment package; it also marked a shift in development strategy from inward orientation to outward orientation (Yildizoglu and Margulies, 1988; Senses, 1984; Onis, 1986; Dervis and Petri, 1987). Trade and financial liberalization were the main policy tools in this stabilization programme.

3.2. Trade Liberalization in Turkey

After pursuing the "import substituting industrialisation strategy (ISI)" as a dominant industrialization strategy in the 1950s, 1960s, and 1970s, Turkey switched to an outward-oriented industrialization strategy with the IMF-supported stabilization programme that was introduced to resume growth following the economic crisis in 1980. Rapid export growth was one of the main objectives of the 1980 stabilization programme to improve the huge trade deficit, restore international creditworthiness and establish the credibility of liberalization reforms at home. A variety of incentives were introduced to promote manufactured exports. These incentives included tax rebates, credit subsidies, and foreign exchange allocated for the import of intermediate products.

The success of the liberalization process in the 1980s prompted the government to pursue further liberalization in the 1990s. Therefore, Turkey liberalized her import regime by abolishing the deposit requirement for imports and the import licensing system in the early 1990s. Accompanying agreements with the World Trade Organisation (WTO) in 1994 have significantly contributed to the liberalization of the import regime. As a member of the WTO, Turkey has adopted the rules and procedures governing the multilateral trading system and entered into negotiations with several Eastern and Central European, Mediterranean and Baltic countries to conclude free trade agreements.

In 1996, Turkey entered into a new era by signing a Customs Union Agreement with the European Union (EU). After the liberalization programme in 1980, this was the second most important development affecting the Turkish economy as a whole. Except for sensitive products, mainly motor vehicles, footwear, and furniture, Turkey lifted all tariff and non-tariff barriers for manufacturing products originating from the EU. Turkey also adopted the EU's Common External Tariff for goods imported into Turkey from third countries. This required a further liberalization of her tariff regime, since Turkish protection rates were higher overall than the Common External Tariff (Harrison et al., 1996; Togan, 1997). Moreover, Turkey had to reduce her tariffs to countries that signed a Preferential Trade Agreement (PTA) with the EU.

3.3. Financial Liberalization in Turkey

Prior to 1980, Turkey was a typical example of highly restricted and segmented financial markets (Akyuz, 1990). Interest rates were determined institutionally and kept at artificially low levels. By the end of the 1970s, real interest rates became highly negative due to the acceleration of inflation (Fry, 1979). The state owned banks were dominant institutions in the Turkish financial system (Fry, 1979). Entry into the banking sector (domestic and foreign) was restricted.

Since then, Turkey has been experiencing a liberal approach to its financial markets as a key component of the newly adopted growth-oriented structural adjustment program since 1980 (Aricanli and Rodrik, 1990). When the authorities lifted the ceilings on personal time deposit rates and lending rates were abolished⁴. At the time it was considered a "major step in deregulation of interest rates which breaks a practice that has been in force some 50 years" (Wolff, 1987:104). This policy change was not very smooth and the reluctant behaviour of the financial institutions required the authorities to intervene into the sector two years after the implementation of financial liberalization and to determine interest rate for a period.⁵ Another development, in the first half of the 1980s, was that residents (and non-residents) were allowed to open foreign exchange deposits in commercial banks (Rittenberg, 1988).

The essential regulation was finally initiated in 1985, when the new Banking Law was enacted. The law introduced new regulations in terms of provision for a minimum capital and a capital adequacy ratio. The ownership structure of banks was also regulated. Furthermore, a Bank Supervision unit at the Central Bank became operational in 1986. Thus, five years after the initial liberalization of domestic interest rates, an adequate regulatory and institutional framework

was defined and became operational.

After the liberalization of the capital account in 1989 and establishment of the supervisory and regulatory unit at the Central Bank, it was believed that an adequate regulatory and institutional framework was finally defined and became functional. However, the crises of November 2000 and February 2001 have shown that these developments were not sufficient to have stable, efficient and well-established financial markets in Turkey. These crises led not only to the establishment of a new institution, namely the Supervisory and Regulatory Board of Banking, which aimed at restructuring the financial system in 2000, but also to the development of new policies that proposed an efficient and effective financial market. It can be argued that the Turkish financial system finally had an independent supervisory and regulatory body, 20 years after beginning to implement liberalization policies in the financial sector.

4. Measurement of Trade Liberalization and Financial Development

4.1. Measurement of Trade Liberalization

Researchers in the recent empirical literature concentrate on finding reliable proxies of trade liberalization. However, the share of export as a percentage of income, the share of the import as a percentage of income, the share of export plus imports (trade volume) as a percentage of the income and tariffs constitute very common proxies for trade liberalization in the empirical literature. In this article, the following proxies of trade liberalization are employed in the empirical analysis.

Export to GDP ratio (X/GDP): The first theoretical channel that links openness to economic performance goes through the allocation of resources. According to this argument, opening up to international trade brings about reallocation of resources according to comparative advantages (Grossman and Helpman, 1992, Young, 1991). Since the direct effect of the allocation of resources is observed on the level of exports, the share of exports in total production can be used to represent this dimension of openness. In addition, the share of exports in production can be used as a proxy of openness to capture the dimension of openness related to scale economies and the availability of inputs.

Import to GDP ratio (M/GDP): The import share in total production can be used as an openness proxy characterizing the dimension of openness related to increased international competition. It also represents the allocation effect of openness since the imports of those sectors that have comparative disadvantages will increase following trade liberalization.

Foreign trade to GDP ratio ($X + M/GDP$): The share of the total of exports and imports in total production provide the

⁴ The developments in financial sector since 1980 are explained in more detail Akyuz (1990), Cosan and Ersel (1986), Inselbag and Gultekin (1988), Cizre-Sakallioğlu and Yeldan (2000), Ozatay and Sak (2002) and Rittenberg (1988).

⁵ A Tiyas (1990) explains in detail of the response of private sector to financial liberalisation.

proxy that represents the technology spillover dimension of openness. Openness to trade facilitates access to the technological information in the world (Grossman and Helpman, 1992, Chp-9), which creates technological spillover through imports as well as exports.

4.2. Measurement of Financial Development

One of the most difficult aspects of empirically investigating the relationship between financial development and economic growth is the measurement of "financial development". However, the practitioners are forced to form a well-defined set of measures of financial development by the availability of data at hand. The proxies proposed for measuring the level of financial development are basically chosen from the monetary and credit aggregates in an economy. The rationale for the inclusion of a wide range of proxies is to maximize the information on financial development. In other words, diverse aggregates should be able to catch different functions of the financial markets. In this article, the following proxies⁶ for financial development are employed in the empirical analysis.

Narrow Money Ratio ($M1/Y$): In the absence of the financial sector economic agents have to hold their financial assets at hand. This means that the funds for investment will be kept out of the financial sector in the economy. With financial development, the ratio of narrow money to income will decrease.

Narrow Money Broad Money Ratio ($M1/M2$): In a fragmented financial sector, economic units may prefer to hold their funds out of the financial sector to remain liquid. However, developments in the financial system in terms of not only organizations such as banks but also instruments in this sector may lead people to put their money in the banking sector, through which investment can be carried out. In short, with financial development, deposits in the banking sector may be increased and as a result the $M1/M2$ ratio will decrease.

Broad Money Ratio ($M2/Y$): Monetary aggregates also provide an alternative set of variables to measure the extent of financial development (De Gregorio and Guidotti, 1995; Galetovic, 1996; Lynch, 1996). In the literature, the commonly used measure of financial development is a ratio of some broad measure of the money stock, usually $M2$, to the level of nominal income (Gelb, 1989; King and Levine, 1993a, 1993b; Murinde and Eng, 1994a, and 1994; Lyons and Murinde, 1994; Demetriades and Hussein, 1996; Arestis and Demetriades, 1997; Kwan et. al., 1998). This simple indicator measures the degree of monetization in the economy. The monetization variable is designed to show the real size of the financial sector of a growing economy. Money provides valuable payment and saving services. The 'narrow money' stock best reflects the former

and 'broad money' the latter. Narrow money balances should rise in line with economic transactions, but broad money should rise at a faster pace, if financial deepening is occurring (Lynch, 1996).

It is argued that the use of monetary aggregates as a proxy for the degree of financial development might also presents problems (De Gregorio and Guidotti, 1995; King and Levine, 1993a). King and Levine (1993a) note that different definitions of monetary aggregates may act as proxies for different roles of financial intermediation. In some cases monetary aggregates may be very poor indicators of the extent of financial development. For example, De Gregorio and Guidotti (1995) criticize the use of narrow money to income ratio as a proxy for financial development. They argue that a high level of monetization ($M1/GDP$) is the result of financial underdevelopment, while a low level of monetization is the result of a high degree of sophistication of financial markets, which allow individuals to economize on their money holdings. De Gregorio and Guidotti (1995) suggest to use a less liquid monetary aggregate ($M3$ or $M2/GDP$) as a proxy for financial development. It is expected that the broad money ratio is positively related to growth.

$M2Y$ Ratio ($M2/Y$): $M2Y$ definition of the money includes the deposits in the foreign currency in the national banking system. After financial liberalization, in a broader sense, capital account liberalization in 1989, foreign savers may utilize the real return in the countries where the real rate of interest is high. In addition, in an unstable economy, the domestic economic unit may prefer to hold their assets as foreign currency in the banking system in order to minimize the impact of economic shock coming from the exchange rate risk. It is therefore important to consider this ratio as a proxy for financial development in countries where there is capital account liberalization, which is the case in Turkey partially after 1980 and in full after 1989.

4.3. Construction of Trade Liberalization and Financial Development Indexes

As discussed in the previous section, each measure (proxy) for trade liberalization or financial development captures a different aspect of the issue and therefore, it is better to develop a tool to overcome these problems. In other words, the characterization of the relationship among alternative proxies gains importance. In considering all these facts, the task is to find out a latent variable that combines different dimensions of trade liberalization or financial development together and provides a single measure of trade liberalization or financial development. Principle component analysis can be used to combine this information in trade liberalization and financial development proxies.

The main idea of principle component analysis is to reduce the dimensions of a data set that consists of a

⁶ For a more comprehensive set of measures of financial development, see Lynch (1996).

number of interrelated variables, making use of the covariance between them, while retaining as much as possible of the variation present in the data set (Jolliffe, 1986). This is achieved by the linear transformation of data that are orthogonal to each other. The method of principle component analysis can be applied by using the original values of the data or their deviations from their means or standardized variables. Since the method is sensitive to the unit of measurement of the data, it is better to use standardized variables when the variables are measured in different units.

Furthermore, considering the fact that the proxies are non-stationary, principle components were estimated on the data matrix of the difference of the logs of the standardized variables for the period concerned. The variances of the principle components are the eigenvalues (λ_{ij}) of the variance-covariance matrix (Σ) of the data. The elements of the corresponding eigenvector of the first principle component are the coefficients that will be used for the linear combination of the proxies. Therefore, the one-dimensional measure of trade liberalization (or financial development) can be found as follows:

$$op_t = \sum_{i=1}^5 \lambda_i z_{it} \quad (8)$$

where op_t represents the one dimensional measure of trade liberalization (or financial development) at time t ,

z_{it} is the standardized i^{th} trade liberalization (or financial development) proxy at time t , and λ_i is the eigenvector component that corresponds to a complementary measure of i^{th} proxy.

For trade liberalization, three proxies, namely ratio of export to income (X/Y), ratio of import to income (M/Y) and ratio of export plus imports to income ($OPEN$) are used to obtain a trade liberalization index (TL):⁷

$$TL = 0,9852L(M/Y) + 0,9991L(OPEN) + 0,98L(X/Y) \quad (9)$$

where L denotes the logarithm of the following variables. As can be seen from the coefficients of the trade liberalization proxies, they have positive impacts on the trade liberalization index.

The index for financial development (FD) includes the monetary aggregates, namely $M1/Y$, $M1/M2$, $M2/Y$ and $M2Y/Y$. The FD index as follows:

$$FD = -0,905L(M1/Y) + 0,23L(M2/Y) + 0,941L(M2Y/Y) - 0,989L(M1/M2) \quad (10)$$

where the all the letters are defined as above. The coefficient for financial development index indicates that $M1/Y$ and $M1/M2$ are negatively related to the index and the others vice versa.

In order to test the joint impact of trade liberalization and financial development on economic growth as discussed theoretically by Blackburn and Hung (1998), we initially intended to do as Siddiki (2002), who includes two variables for both trade liberalization and financial development in the same regression. Due to the existing high correlation ($r = 0,98$) among trade liberalization and financial development indexes, it may not be appropriate to include both at the same time in a regression. Therefore, we have decided to construct another index that includes both proxies for trade liberalization and financial development, namely X/Y , M/Y , $OPEN/Y$, $M1/Y$, $M1/M2$, $M2/Y$ and $M2Y/Y$. This new index (EL), therefore, involves proxies for both external liberalization and financial development. In a narrow sense, this index (EL) can be considered as an economic liberalization index, which carries instruments from both aspects of the issue concerned here. The EL index is as follows:

$$EL = -0,979L(M1/M2) - 0,904L(M1/Y) + 0,203L(M2/Y) + 0,903L(M2Y/Y) + 0,962L(M/Y) + 0,97L(X/Y) + 0,98L(OPEN) \quad (11)$$

The coefficients of the EL index are consistent with the above findings.

5. Empirical Results

5.1. Data set and Time Series Properties of the Variables

The research period is determined by the data availability. The annual data is employed for the Turkish economy for the period 1963-2005. The gross national product (GNP) at 1987 constant prices is available from the web site of the State Planning Organization. Narrow money ($M1$) and broad money ($M2$) are taken from the web site of the International Financial Statistics (IFS). $M2Y$ is collected from the electronic data dissemination system in the Central Bank in Turkey. Trade variables (M and X) are also taken from the IFS and converted into national currency by using the exchange rate available in the IFS.

Recent developments in econometrics requires that before undertaking an empirical analysis, time series properties of the data in terms of unit root should be investigated because regression analysis carried out with non-stationary variables may invalidate many of the assumptions of regression analysis. If a time series has a unit root, a widespread and convenient way to remove non-stationarity is by taking first differences of the relevant variable. A non-stationary series, which by differencing d times transfers to a stationary one, is called an integrated of order d and denoted as $I(d)$ (Charemza and Deadman, 1997). In fact, when a series is integrated of order one it means that it is not itself stationary, but that its first differences are stationary. The definition of the variables is presented in Table 1.

⁷ The results of the construction of the indexes are available upon request.

Name of the variable	Definition
LPRY	Log of per capita real income
LK	Log of gross fixed capital formation as a proxy for capital stock
LSEC	Log of secondary school enrolment rate
TL	Trade liberalization index
FD	Financial development index
EL	Economic liberalization index

Table 1. Definition of the Variables

The results of the Dickey-Fuller (DF) and Augmented Dickey - Fuller (ADF) unit root tests for the variables are presented in Table 2. The critical values are produced by the Eviews 5.0 econometrics program, which is based on the response surfaces in MacKinnon (1991). L and D respectively denote the logarithm and difference of the variable in concern.

Variables	Intercept without trend	5 % Critical Value	Intercept with trend	5% Critical Value	Results
LPRY	-0.750 (0)	-2.93	-2.812 (0)	-3.52	Not I(0)
LK	-1.090 (0)	-2.93	-2.313 (0)	-3.52	Not I(0)
LSEC	-1.971 (4)	-2.94	-2.123 (0)	-3.52	Not I(0)
FD	-0.452 (0)	-2.93	-3.451 (4)	-3.53	Not I(0)
TL	-0.293 (0)	-2.93	-3.026 (0)	-3.52	Not I(0)
EL	-0.110 (0)	-2.93	-3.494 (4)	-3.53	Not I(0)
DLPRY	-7.035 (0)	-2.93	-6.953 (0)	-3.52	I(0)
DLK	-5.60 (0)	-2.93	-5.590 (0)	-3.52	I(0)
DLSEC	-3.07 (3)	-2.94	-3.120 (3)	-3.53	I(0)
DFD	-6.230 (0)	-2.93	-4.557 (7)	-3.54	I(0)
DTL	-5.152 (0)	-2.93	-5.097 (0)	-3.52	I(0)
DEL	-5.22 (0)	-2.93	-5.185 (0)	-3.52	I(0)

Not: The order of augmentation in the Dickey-Fuller regressions is chosen using the Akaike Information Criterion and the numbers given in the brackets in columns two and three represent the order of augmentation.

Table 2. DF and ADF Tests for Unit Root

The results of DF and ADF unit root tests show that the levels of the variables are not stationary, but that their first differences are stationary, with or without the inclusion of a deterministic trend.

5.2. Estimation of the Long-term Production Function

The next step, in the light of 'new' growth theory, is to examine the multivariate cointegration issue among the variables considered. Accordingly, a measure of physical capital (i.e. gross domestic capital formation), a measure of human capital (i.e. the secondary school enrolment rate defined as the number of the students in the secondary school divided by total population) and one of the indexes, namely TL, FD and EL, constructed above will be included in the empirical analysis.

Following Roubini and Sala-i Martin (1992), Coe and Moghadam (1993), Piazzola (1995), Leigh (1996), Odedokun (1996, 1999), Ghatak, Milner and Utkulu (1995, 1997), Siddiki (2002) and Liand and Teng (2006), the augmented production function with trade liberalization and financial development can be written as follows:

$$Y = f(K, H, X_i) \quad f_1, f_2, f_3 > 0 \quad (7)$$

Where Y is output, K is physical capital, H is human capital, X_i ($i = 1, 2, 3$) denotes the trade liberalization, financial development and the joint impact of these two components of economic liberalization. The coefficients for these three variables are the concerns of this paper and it is expected that they have positive impacts on economic growth.

The rationality of the variables in the production function needs some detail. Those variables explained in the previous section will be referred to in order to avoid repeating them. Since it is highly unrealistic to assume that financial development is the sole or even the main driving force behind the growth process, the potential effects of more conventional factors should be isolated by including some variables. Renelt (1991) argues that it is possible to find a significant relationship between growth and many of the other variables in the empirical literature, particularly in cross-country studies. Following Renelt (1991), the production function includes supply side variables, namely physical capital, labour, human capital, trade liberalization and financial development. In order to understand the true interactions, potential policy variables are explicitly modelled.

According to Scott (1992), physical capital seems to be a much more important determinant of economic growth than neo-classical growth theory suggests. An increase in investment not only raises the rate of economic growth, but also creates large positive external effects (learning effects). Physical capital is approximated by the gross

fixed capital formation in the empirical studies (Fosu, 1990; Ghatak, Milner and Utkulu, 1995; Piazzolo, 1995; Most and van den Berg, 1996; Alexander, 1997; Ghura, 1997). The main reason why capital formation is not employed is that there are no annual depreciation rates at hand. It is expected that the physical capital should have a positive effect on economic growth.

A substantial body of recent economic theory has emphasized human capital as a determinant of economic growth. Not only does the new growth theory stress the importance of human capital (Romer, 1986; Lucas, 1988; Barro, 1991 and 1998; Piazzolo, 1995; Glomm and Ravikumar, 1997; Hwang, 1998), but human capital augmented neo-classical models as well (Mankiw et. al., 1992; Grammy and Assane, 1996). The educational level of a society serves as a proxy for the development of human capital. Education increases the quality of the labour force, and therefore, the long-term production possibility curve shifts outward. An increase in the educational level has a positive effect on economic growth. In other words, a better educated labour force will be more productive on the job by requiring less supervision and possessing greater initiative in handling job-related problems.

The production function is estimated using the Johansen cointegration procedure. In particular, economic theory often suggests that the path of certain pairs of variables should not diverge, at least in the long term, though they may diverge in the short term due to seasonal factors. If the variables continue to diverge, market forces or other instruments commence to cause them to converge again. In this vein, cointegration means that one or more linear combinations of these variables are stationary even though individually they are not. If these variables are cointegrated, they cannot move "too far" away from each other. In other words, if there is a long-term relationship between two or more non-stationary variables, the idea is that deviations from this long term path are stationary (Charemza and Deadman, 1997). In contrast, a lack of cointegration suggests that such variables have no link; they can wander arbitrarily far away from each other.

The application of the Johansen cointegration procedure (Johansen, 1988; Johansen and Juselius, 1992) in the empirical literature is very common. This methodology emphasizes the identification of long-term relationships, and hence is particularly appropriate for studying the determinants of potential output. These new developments in time series econometrics have been recently exploited in the growth literature (Serletis, 1994; Jones, 1995; Piazzolo, 1995; Leigh, 1996; Arestis and Demetriades, 1997; Cellini, 1997; Hansson and Jonung, 1997; Lau and Sin, 1997; Batina, 1998; Hwang, 1998; Rousseau and Wachtel, 1998; Siddiki, 2002; Liang and Teng, 2006). Studies mentioned above utilizing the time series properties and cointegration analysis have attempted to establish a long term relationship between the level of the

set of the variables in their empirical analysis.

The Johansen cointegration procedure involves estimating a Vector Autoregressive Model (VAR) such as (Holden and Thompson, 1992; Charemza and Deadman, 1997):

$$Z_t = A_1 Z_{t-1} + \dots + A_k Z_{t-k} + \varphi D_t + u_t \quad (13)$$

where Z_t is a $(n \times 1)$ vector that contains current and lagged values of n variables which are each assumed to be $I(1)$, each A_i is an $(n \times n)$ matrix of parameters, D_t is a vector of $I(0)$ variables⁸ and u_t is the vector of random errors. Here, the formulation of the VAR model is of major importance because the results of the cointegration test can be very sensitive to that formulation. There are two main interrelated issues that particularly should be taken into consideration. The first one is to include an appropriate lag length to ensure that the residuals are white noise. The second is that using too many lags reduces the power of the statistics. Therefore, the choice of the appropriate lag-length is important. There are several criteria to determine the appropriate lag-length in the empirical literature, namely the Akaike Information Criteria, the Schwarz and Hannan-Quinn criteria.

Following the economic discussions in the previous section, the variables are classified under three groups. The first one assesses the impacts of trade liberalization on the production. The second one concerns the relationship between the financial development and income. Finally, the last asserts the joint effect of trade liberalization and financial development (economic liberalization) on economic growth. The correlation coefficient between trade liberalization and financial development indexes are quite high ($r = 0,98$), and therefore two variables are not included in the same regression. Formally, the three groups of the variables are named as models and formed as in Table 3:

Model I	LPRY, LK, LSEC, TL
Model II	LPRY, LK, LSEC, FD
Model III	LPRY, LK, LSEC, EL

Table 3. Definition of the Variables and the Systems

Empirical investigation (carried out E-views econometric software programme) starts from an augmented VAR with four lags on all variables. The Schwarz and Hannan-Quinn criteria showed that, in all models, appropriate lag length is equal to one (available upon request). After the establishment and estimation of the VAR, the cointegration statistics, namely maximum eigenvalue and trace statistics,

⁸ D_t actually represents a vector of any variables that are included in the system to ensure that errors u_t are white noise; thus it may contain dummy variables as well.

developed by Johansen are applied to test whether there is a long-term relationship among the variables. The results are presented in Table 4.

Ho: rank=r	Max Eigen.	5%	Trace	5%
Model I				
r= 0	35,629*	28,588	68,529*	54,079
r< = 1	19,213	22,299	32,899	35,192
r< = 2	9,242	15,892	13,686	20,261
r< = 3	4,444	9,164	4,444	9,164
Model II				
r= 0	38,260*	28,588	74,425*	54,079
r< = 1	20,457	22,299	36,164*	35,192
r< = 2	12,456	15,892	15,707	20,261
r< = 3	3,250	9,164	3,250	9,164
Model III				
r= 0	37,205*	28,588	69,534*	54,079
r< = 1	19,615	22,299	32,328	35,192
r< = 2	8,628	15,892	12,712	20,261
r< = 3	4,084	9,164	4,084	9,164

Table 4. Johansen Cointegration Test Results

Both trace and maximum eigenvalue statistics showed that there is at least one cointegrating vector for each model. Trace statistics indicated that there are two cointegrating vectors in Model II. For the same model, the maximum eigenvalue statistic resulted in one cointegrating vector. Therefore, one cointegrating vector for the Model II is assumed in the further analysis.

The corresponding cointegrating vectors for each model respectively presented as follows (standard errors are given in the parenthesis):

$$CI1 = LPRY - 0,1206 LK - 0,311 LSEC - 0,019 TL - 2,454 \quad (14)$$

(0,058) (0,101) (0,002) (0,185)

$$CI2 = LPRY - 0,008 LK - 0,46 LSEC - 0,015 FD - 2,80 \quad (15)$$

(0,04) (0,07) (0,001) (0,16)

$$CI3 = LPRY - 0,046 LK - 0,42 LSEC - 0,009 EL - 2,67 \quad (16)$$

(0,05) (0,08) (0,001) (0,16)

As far as the empirical results are concerned, secondary school enrolment rate, financial development and trade liberalization are statistically significant. The sign of the variables concerned (TL, FD and EL) is as argued in the theoretical discussion above. Particularly, human capital accumulation (LSEC) in three models (Equation 14, 15, 16) is significant and influences economic growth positively. The impact of trade liberalization (TL) on per capita income is positive

(Equation 14). In addition, financial development has positively contributed to economic growth (equation 15). Finally, although the magnitude of its coefficient is very small, the variable for economic liberalization (EL), which captures the aspects of both trade liberalization and financial development, also has a positive effect on the growth rate. However, physical capital in Models II and III (LK in Equation 15 and 16) seems to be insignificant.

The empirical analysis shows that financial development (FD) and trade liberalization (TL) separately have positive contributions to economic growth in Turkey. In addition, the joint impact of trade liberalization and financial development in terms of economic liberalization (EL) also positively influence economic growth. As argued by the endogenous growth literature, human capital also positively affects income.

6. Conclusion

With the emergence of the new growth theories, the impact of economic policy on economic growth has been a hotly debated issue. In other words, whether economic policies in a country influence the economic growth is an empirical issue. This paper empirically investigated whether trade liberalization and financial liberalization have had any significant impact on economic growth in Turkey which, as a developing economy, has witnessed an unprecedented staged reform attempt involving external (trade) and internal (financial) liberalization, especially after the 24 January Decisions following the economic crisis in 1980. In Turkey, economic liberalization in terms of trade and the financial sector was at the heart of the stabilization programme employed in 1980 and has constituted an integral part of the economic policies since then. The theoretical core of the economic reform programme is to provide efficiency in the allocation of scarce resources and to mobilize unproductive resources into investment and hence promote economic growth.

To test the impact of trade liberalization and financial development on Turkish economic growth, three alternative measures (indexes) were developed by making use of the principal components analysis, namely trade liberalization, financial development and, in a sense, economic liberalization proxies. The empirical results, obtained by employing the methods of the time series econometrics for the period 1963-2005, showed that trade liberalization and financial development positively contributes to economic growth. Furthermore, the joint impact of trade liberalization and financial development in terms of economic liberalization on economic growth is also significant in Turkey. \square

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