Does trade liberalization cause a long run economic growth in Turkey?

Utku Utkulu[ψ] Durmus Özdemir[ϑ]

Abstract:

Based on the 'endogenous' growth theory, the paper examines the effect of trade liberalization on long-run income per capita and economic growth in Turkey. Although the presumption must be that free trade has a beneficial effect on long run growth, counter examples can also be found. This controversy increases the importance of empirical work in this area. We have included the most recent data and employed multivariate cointegration analysis to test the long run relationship among the variables in hand. In a multivariate context, the effect of determinants such as increasing returrns to scale, investment in human and physical capital are also included in both theoretical and empirical works. Our causality evidence between the long run growth and a number of indicators of trade liberalizations confirms the anticipations of the 'new growth theory'. However, the overall effect of the possible breaks and/or policy change and unsustainability in the 1990s looks conradictory and deserves further investigation.

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[ψ] Dokuz Eylül University Department of Economics, E-mail: utku.utkulu@deu.edu.tr
[ϑ] Istanbul Bilgi University, Department of Economics, E-mail: dozdemir@bilgi.edu.tr

1. Introduction

Do trade liberalization and increased openness lead to a higher rate of economic growth? This has been one of the most controversial issues in international economics over the years. Turkish economy, since the major opening up operation of the early 1980's created very unstable growth path, which has been one of mini boom-and bust cycles. High mobility of international capital flows brought number of major economic crises, which worsened the fluctuations in per capita income.

Since Adam Smith, the debate between pro-traders and protectionists has raged over the years. The neoclassical growth model explains that the sole determinant of long-run growth in per capita income is the exogenously determined technology. This suggests that the long run economic growth can not be influenced by the interaction with other countries. There may be effects of openness on the long-run level of welfare and the transition to steady state (convergence). Some of the recent studies have redirected from income convergence to factor price equalization. This form of research links the trade theory (i.e. Heckscher-ohlin theory) with the theory of economic growth. Ben-David (1993) Slaughter (1997) and Ventura (1997) are all examples to the factor price equalization studies. For example Ventura, who attempt to explain the rapid growth of East Asia has shown that shifting into a more capital intensive export sectors means that in effect a small open economy can evade diminishing returns.

Romer (1990) outlines a general implication of endogenous growth theories is that through increasing the scale of spillovers or available technology openness to trade should increase growth. However openness and trade may stimulate economic expansion in some countries, it could reduce growth in others. The existing empirical literature shows that the effect of trade liberalization and increased openness on economic growth has four main channels; Encouraged capital accumulation, factor price equalization, knowledge spillovers and the trade-mediated technology. The effect of trade on growth can be summarized as how openness influences technological change. Rivera-Batiz (1995) outlines several key mechanisms through which trade and innovation are related. The first effect is the re-allocation effect that is the international trade can affect economic growth by reallocating resources among sectors and industries. For example, if trade raises the use of the amount of human capital, which is a key source for creating innovations, for production of

manufacturing industries. The increase in skilled labour demand within the productive activities would drive human capital away from research and development. This may reduce innovation and growth. The second effect of international trade is about the transmission of knowledge and ideas across any two countries. Trade restrictions reduce flows of technological information across countries and this has a negative effect on long-run growth. Here there is a counter argument that the impact on economic growth is being limited if the domestic innovation system is not able to handle productively the new knowledge. For example; the local resources are unable to use the new information generated by openness. Openness and international trade increase rivalry and competition among domestic firms and innovation stimulated growth would rise. This third type of effect called the competition effect, which is linked to the issue of imitation. Developed economy innovates and the less developed economy imitates (Grossman and Helpman, 1991). Young (1991) argued that trade liberalization between developed and less developed countries may inhibit learning by doing and therefore growth of general knowledge in developing countries. Trade liberalization can encourage specialization in product lines, which has not have very much learning by doing in developing countries. Young's model has interesting predictions about the trading partner countries. It suggests that the less sophisticated goods, which are assumed to be characterized by high potential labour requirements, are produced in developing countries. Developed countries characterized by opposite case and their trade based on this difference on stock of technological knowledge. Feenstra (1996) describes smaller countries as being smaller in labour force in R&D efficiency units and outlines that in the absence of international spillovers, free trade can lead to a lower growth rates of smaller countries. Esterly and Levine (2001) review more than a decade of empirical work on growth. They concluded that national policies such as the trade regimes do affect growth but what extend is not clear.

It is clear that the given the tools of endogenous growth theory almost any policy choice can be shown to have growth effects through its effect on the accumulation or allocation of physical or human capital. This highlights that what is needed is more empirical evidence on the benefit of openness and trade policy.

Critiques to empirical literature stems from several points; the problem of measurement and the quality of data, problem of endogeneity, problem of omitted variable biased, possible not inclusion of other policies. The association between openness and growth performance affected by number of factors, including country,

region and other attributes. Rodriguez and Rodrik (2000) have argued that trade plays a secondary role compared to deeper factors such as institutions and geography. One of the main difficulty of these type of work is causality. Baldwin and Ricard (1998) confirms that measuring the impact of trade policy and/or openness or growth using cross country regression has generally proven but occasionally misleading exercise. There are a number of recent empirical studies in the area of growth and openness or trade policy. We are unable to go through all of the fascinating literature here but there are few of them worth to mention. Firstly, Rodrigues and Rodrik (2000) emphasize that the trade restrictions are not necessarily good for growth but the converse has not been demonstrated. They questioned one affect of free trade that it generates technological and other positive spillovers to the rest of the economy. They emphasized some of the recent relevant research findings of that firms in fact derive many technological or other benefits from exporting. Causality seems to be from productivity to export, not the other way around. Rodrigues and Rodrik concluded that more research needs to be done to prove that free trade brings benefit.

In general, some of the empirical research results appeared to contradict positive link between free trade and growth. There are also number of research supporting the link, such as; Dollar(1991) Frankel, Romer and Cyrus (1996), Edwards (1993, 1997, 1998), Levine and Lakshmi(1997), Ben-David and Loewy (2000), Gwartney, Skipton and Lawson (2000) , Badinger (2001), Dollar and Kraay (2001) and Ruthford and Tarr (2003). It is clear that the research on trade and openness affect on growth verdict is out.

Harrison *et al*. (2003) focus on the welfare and distribution aspects of trade liberalization. They argue that even if trade liberalization causes welfare gains over all households, it is still possible that the poorest households could lose. They illustrate alternative approaches to designing trade liberalization in Turkey (see also Edwards, 1997).

The aim of this paper is to empirically investigate the impact of trade liberalization on economic growth, using time series evidence for the Turkish Economy. For the Turkish openness and growth case we are extending the data sample used in Ghatak, Milner and Utkulu (1995) for another decade and re-examining the Turkish openness and growth issue. The paper is organised as follows. Section 2 outline the most relevant new growth theories for Turkish case. Section 3 gives a selective survey for the empirical literature in the field. Section 4 highlights

Turkey's development strategy by period. Section 5 reviews measuring trade liberalization for Turkey. Section 6 describes the econometric methodology employed. Section 7 provides the data and reports the results of the empirical work. The last section offers some conclusions and implications.

2. Endogenous Growth Models in Open Economies

There is a large theoretical literature on the relation between growth and trade 'openness. Two sets of formal models are going to be our main focus in this part. A key implications of these models is that it is no longer possible to draw conclusions a priori about the benefit or costs of free trade. The ambiguity in the theoretical conclusions reinforces the importance of empirical work.

The first line of models are about 'learning by doing' (LBD). Romer (1986) eliminates diminishing returns to (the reproducible factor) K by assuming that knowledge creation is a side product of investment. This is similar to Arrow's (1962) model of learning-by-doing. The central idea of learning-by-doing is that, as individuals produce goods, they inevitably think of ways of improving the production process. Improvements in productivity thus occur without any explicit innovations. The accumulation of knowledge is therefore a side effect of conventional economic activity. The simplest case of learning-by-doing is when learning occurs as a side effect of the use of new capital. Then the stock of knowledge is a function of the stock of capital.

Consider Cobb-Douglas production function with labour augmenting technical change for firm i:

$$Y_i = K_i^{\alpha} (B_i L_i)^{1-\alpha} \qquad 0 < \alpha < 1 \qquad (1)$$

B_i is the index of knowledge available to the firm. Now make two assumptions (following Arrow, 1962; Romer, 1986):

1. An increase in a firm's capital stock leads to a parallel increase in its stock of knowledge; i.e. B_i is a positive function of K_i
2. Each firm's knowledge is a public good that any other firm can access at zero cost. In other words, once discovered, a piece of knowledge spills over instantly across the whole economy; i.e B_i=B.

These ideas can be put in a simple form as follows:

$$B_i = \lambda K^{\beta} \qquad \lambda > 0 \quad \beta > 0 \qquad (2)$$

and thus the individual firm production function can be written (i.e by substituting (2) into (1)) as

$$Y_i = K_i^{\alpha} (\lambda K^{\beta} L_i)^{1-\alpha} \qquad (3)$$

Hence, the aggregate production function

$$Y = K^{\alpha} \lambda^{1-\alpha} K^{(1-\alpha)\beta} L^{1-\alpha} \qquad \text{and thus}$$

$$Y = \lambda^{1-\alpha} K^{\alpha+(1-\alpha)\beta} L^{1-\alpha} \qquad (4)$$

The behaviour of the model crucially depends on the APK (average product of capital). In this model the APK variation depends on the exponent on k. Whether APK is an increasing, decreasing or constant function of K thus depends on whether this exponent (= elasticity of APK with respect to K) is positive, negative, or zero. This, in turns, depends on whether β is bigger, smaller or equal to one.

(Since $(1-\alpha) > 0$), if $\beta > 1$ there is an increasing returns to scale. If $\beta = 1$ then there is constant returns to scale if ($n = 0$). If $\beta < 1$ there is decreasing returns to scale (if $n = 0$). For increasing returns to scale, we have explosive growth. In case of constant returns to scale the production function simplifies to:

$$y = \lambda^{1-\alpha} k L^{1-\alpha}$$

In case of decreasing returns to scale the long-run growth rate of the economy is a function of the rate of growth of population.

Young (1991) examines the spillover effects in the development of knowledge across industries, and his examination considers the existence of strong diminishing returns in the LBD process. Young considers the effect of international trade between two economies, the developed (DC) and Less developed (LDC). The international trade based on the difference of stock of technological knowledge. Both economies may produce any one of infinite number of goods but the technology differ in terms of labour requirements. Two economies endowed with a single primary factor of skilled labour. Young's models crucial assumption is that the developed countries stock of knowledge is greater than the developing countries.

$$B_t^{DC} > B_t^{LDC} \qquad (5)$$

Where, B is the stock of technological knowledge.

Young's model, therefore imply that developed countries would most likely to trade with their less developed counterparts and less developed countries likely to trade between themselves. We do not think that this is the case for the Turkish economy.

The second line of models are along the lines of Grossman and Helpman (1991, 1996), which allow us to consider dynamic comparative advantage. The rate of technical progress and the pattern of international trade are jointly and endogenously determined.

This lines of research compiles the Heckscher-Ohlin theory of international trade with a Schumpeterian model of endogenous growth. The main consideration of this type of model of growth is through rising product quality. (i.e. growth through profit seeking R&D). The model considers the effect of international trade between two economies. Each economy consists of three sectors; the final good production sector, intermediate input manufacturing sector and the research sector. It is endowed with two factors of production, skilled and unskilled labour. Final goods sector has a low technology and a high-technology good. High technology goods produced under imperfect competition while low technology goods produced under perfect competition. Each economy is incompletely specialized in the four activities; the low technology production, research, intermediate-imput manufacture and the high technology production. Endogenous growth occurs as a result of improvements in the quality of intermediate inputs, which are used for the production of high technology goods. This multi sector high technology economies output is determined by,

$$Log\, Y = \int_0^1 \log\left[\sum_{\Phi} g^{\Phi}(j).x_{\Phi}(j)\right] dj, \qquad g > 1 \tag{6}$$

where, 'g' denotes the size of innovations and *x(j)* denotes the quality of intermediate input *j* of quality Φ currently produced using high technology[1].

Both theoretical approaches indicate that it is difficult to identify a priori effect of trade policy on long run income per capita and growth. Hence empirical work is crucial. The empirical studies, in general, supports the idea that openness is growth promoting, but it is controversial and subject to a wide variety of chriticism.

3. Empirical Evidence on Openness and Growth

New growth theory provides a variety of suggestions about what actually determines the growth rate of output. It can be seen as an attempt to endogenise technology. The most widely used approach is to run a regression of average growth in output over a period on a number of independent variables which are deemed to

[1] For technical details and the full treatment of the model see Grossman and Helpman (1991, 1996)

affect growth. Prime examples of such variables are trade-policies, government expenditure, and human capital. There have been numerous studies of this type. (Examples; Barro (1991), Levine and Renelt (1992).

Levine and Renelt (1992) is an attempt to systematically assess the significance of the types of variables used in the literature to explain cross-country variations in growth rates. Levine and Renelt undertake an analysis of this sensitivity by initially considering a large set of variables. They find that only a small number of variables such as initial level of income, Human capital and physical cap[ital (Investment) are actually robustly related to economic growth across countries.

None of the variables capturing the stance of fiscal policy, trade policy or macroeconomic stability appeared to be robustly related to growth. This clearly shows that previous findings cannot be generalised on the basis of the available data. Human capital is one of the key variables in many new growth models (e.g. Lucas, 1988; Romer, 1990, and for Turkish case; Ghatak, Milner and Utkulu, 1995). In Lucas's model it is the variable which generates the externality necessary for endogenous growth. In Romer's paper it is the key input in the production of new technologies. However, it is also possible to set up a more sophisticated version of the neo-classical growth model, with human capital included as an additional factor or production. This is done in Mankiw *et al.* (1992).

The evidence on developing countries is also unclear. The World Bank especially has argued for a long time now that trade liberalisation is a key ingredient to successful growth performance. However, as shown in Levine and Renelt (1992), this view is not strongly supported by the evidence. There seems to be a fairly strong consensus on one key ingredient: human capital. Investment in education and training is regarded as a key to growth in industrialised and developing countries.

Overall, the growth process appears to be extremely complex and not easily explained by simplistic models. There are many ingredients, such as institutions (e.g. the state of the legal system) which cannot readily be modelled (see North, 1991, for a discussion of the role of institutions). Young, A. (1992) has examined the economies of Hong Kong and Singapore more closely. Between 1960-85, average growth in both countries was very similar. The differences come from the role of capital accumulation.

There is a large number of empirical research in the openness and growth literature. Esterly and Levine (2001) reviewed more than a decade of empirical work

in this area. It is not possible to mention all of them here but there are few worth to mention. Rodriguez and Rodrik (2000), Srinivasan and Bhagvati (2001) suggest that, as opposed to the cross country regression, country level studies may yield more robust conclusions. Some recent studies appeared to conclude that the trade and openness is growth promoting. Examples to these lines of research, Edwards (1997), Gwartney, Skipton and Lawson (2000), Dollar and Kraay (2001), Ahmed (2003), Ruthford and Tarr (2003). They all seem to conclude that there is a strong effect of trade on growth. The verdict is still out as to which type of openness and trade policy effect economic growth empirically.

4. Development Strategy for Turkey by Period

For half a century, from the 1930s to the beginning of the 1980s, except for short period of time liberalization experience between 1950 to 1953, Turkey followed a strategy of growth through inward-oriented import-substitutionist industrialisation (ISI) strategy coupled with intensive government intervention. The government has had a leading role in the economy by creating public enterprises while putting barriers to trade and financial flows (Wagstaff, 1989). Although it is useful in discussing long-run economic developments by aggregating information in a few periods, Turkey's changing development strategies suggest a much more detailed periodisation. Table 1 illustrates the periods.

From the early 1930s to the early 1980s, Turkey's economic policies are characterised as interventionist and protectionist (Wagstaff, 1989). Accordingly, policies were mainly designed to protect domestic industry from foreign competition and increase the government controls over the allocation of resources and production of goods. These included the following policies and principles (Saracoglu, 1987):

a) encouragement of the domestic industrial sector with minimal foreign competition (infant industry argument) through the introduction of quotas, high tariffs and licensing requirements;

b) a high level of monetary expansion to finance large fiscal deficits;

c) support to the industrialisation process and avoidance of bottlenecks by the creation of state economic enterprises (SEEs) in sectors such as steel production and mining;

d) control over the quantity and price of credit to influence the sectoral composition of investment within the private sector;

e) the maintenance of fixed exchange rates and exchange controls which results in overvalued domestic currency.

Table 1: Turkey's Development Strategy, by Period, the Republic years

Period	Institutional Setting	Development Strategy
1923-29	Private enterprise, free trade with low tariffs (Lausanne Treaty)	Westernisation, recovery, infrastructure, industrialisation, tax reform)
1929-39	Etatism, mixed economy with large public enterprise sector, balance of payments controls, primitive five-year planning	Inward-looking import substitution, infrastructure, industrialisation
1939-46	Etatism, mixed economy, war economy for neutrality	Military considerations
1946-50	Relaxed etatism, mixed economy, controls	Recovery, increased emphasis on agriculture
1950-53	Democracy, trade liberalisation, mixed economy	Agricultural expansion and mechanisation
1953-59	Democracy, mixed economy, balance of payments controls	Agricultural expansion, import substitution
1959-62	Democracy replaced by military regime, etatism, mixed economy	Stabilisation
1962-78	Democracy, mixed economy, comprehensive planning, labour market liberalisation	Import substitution
1978-80	Same as in 1962-78	Stabilisation
1980-85	Military regime followed by limited democracy, mixed economy, trade and financial liberalisation, labour market repression	Stabilisation, export-oriented growth
1985-	Democracy, mixed economy, trade and financial liberalisation, accelerating inflation	Export-oriented growth

Source: Hansen (1991), p.264.

The foreign trade regime of the 1950s was highly restrictionist, and was characterised by constantly changing controls, regulations, and multiple exchange rates. Thus, the trade policy did not reflect any long-term aim or strategy. On the contrary, it became increasingly restrictionist as a result of ad hoc measures introduced in reply to the growing trade deficit. The initial experiment with a liberal trade policy (1950-53) was not an attempt to pursue on a lasting course toward free trade. The 1958 program were essentially correctional and were not aimed at permanently creating a more liberal trade regime. It is also true that the devaluation package had some distortion-reducing elements, but the anti-export bias was maintained. The overall economic policy during the 1950s were essentially inward looking, but it was based neither on an explicit economic theory nor on formal planning. Economic policy was made mostly on an ad

hoc basis, and there was a general lack of interest in coordinating economic policies. Eventually, the economy was pushed to the point of international bankruptcy by the late 1950s. Overall, most criticized aspect of the Democrat government in the 1950s had been unplanned and uncoordinated economic decisions which had originated from its perception of "liberal" economic policies. Towards the end of 1950s, economic crisis resulted in political crisis.

During the 1929-1980 era, Turkish development strategies have been dominated by import-substitution with two short periods of relaxed trade controls in 1950-53 and 1970-73.[2] National planning years of the 1960s and the 1970s mark an intensive import-substitution drive in Turkey, which was mainly implemented through effective quantitative restrictions and a deliberate policy of overvalued foreign currency regime. As a matter of fact, looking in retrospect, three sub-periods can be roughly identified (see Table 2). In this respect, although import-substitution was primarily adopted by the first five-year plan (1963-67) as means of reaching the industrialisation goal, by the time of the second five-year plan (1968-72) the motivation for inward-looking import-substitution policies stemmed much more from balance-of-payments difficulties (Krueger, 1974).

Table 2: Stages of Import-Substitution Industrialisation (ISI), 1963-80

	Average annual growth rate (%)				
	GNP	Agriculture	Manufacturing Industry	Imp./GNP	Exp./Imp.
1963-70**(a)**	6.4	2.6	10.4	6.8	0.68
1971-77**(b)**	7.2	4.3	10.1	10.9	0.45
1978-80**(c)**	0.5	2.4	-2.7	9.4	0.43

(a) Positive ISI financed with domestic savings.
(b) Negative ISI financed with foreign deficit.
(c) Economic crisis years.
Sources: Pamuk (1984, Table 1, p.53); SPO Annual Programs.

According to the planners, the role of trade policy would be to provide protection to domestic industries (i.e. "infant industry" argument) and to allow the imports of capital goods and raw materials considered essential to achieving this three objectives. The development plans of the 1960s and 1970s had the following main objectives in common (Baysan and Blitzer, 1991):

a) economic growth,

[2]Baysan and Blitzer (1991) argue that in 1958-60 the trade regime was inward oriented and restrictionist since the 1958 program were essentially correctional and were not aimed at permanently

b) structural change by setting higher growth targets for manufacturing industries, and

c) development of import-competing industries and diversification of exports.

The inward-looking ISI strategy was successful in so far as growth rates remained high. The etatist-oriented policy collapsed after the first oil shock in 1973-74, the deterioration of the domestic political scene when domestic inflation and foreign borrowing increased beyond sustainable levels and foreign lending to Turkey finally dried up. In due course, an external debt crisis became inevitable in 1978. An important factor that tended to make the etatist policy unsustainable and contributed to its breakdown was the excessive increase in real wages, a result of the liberalisation of the labour market and the legalisation of labour unions which the 1961 constitution guaranteed (Hansen, 1991).

Dervis *et al*. (1981) and Chenery *et al*. (1986) evaluates the impact of the import-substitution measures of the 1960s and the 1970s. They suggest that ISI policies have had remarkable contribution to the growth rate of GDP especially during the 1960s. In that sense, they support the view that early import-substitution (1960s for the Turkish case) may exploit natural advantages and be highly efficient, but sooner or later these advantages would be exhausted. It is suggested that Turkey should have reached this stage in the 1970s.

A turning point in Turkish economic policy came in January, 1980. At the time, the government announced an economic reform program, after several unsuccessful attempts in 1978-1979 and several failed IMF programs. Inward-looking ISI strategy was replaced by an outward-oriented ELG strategy. The economic reform program, primarily, consisted of the following objectives and arrangements which have been realized to an extent:

a) abandonment of an inward-oriented ISI strategy, and replacement with outward-oriented one based on a more market-based economy (this is the macro and the main objective of the Turkish economic reform program);
b) reduction of direct government intervention in the productive sector;
c) lowering of barriers to foreign direct investment;

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creating a more liberal trade regime. It is also true that the devaluation package had some distortion-reducing elements, but the anti-export bias was maintained.

d) broad-based price liberalization, including a realistic and flexible determination of exchange and interest rates;
e) gradual import liberalization;
f) tight monetary controls and discipline to restrain domestic absorption and reduce the inflation rate;
g) inancial sector reform; by the end of the 1980s, there were only few remaining restrictions on the financial markets;
h) public enterprise reform to reduce their heavy burden on the economy and improve their efficiency;
i) encouraging privatization and limiting the extent of public enterprises;
j) deregulation and rationalization of the public investment programme;
k) export drive strategy; that is, more effective export promotion measures to encourage rapid export growth;
l) steps to an improved external debt management and increase the creditworthiness.

An overall evaluation of the above objectives of the 1980 reform programme simply reflects a transition experience from an inward-looking economy to an outward and more market based one. Accordingly, the programme has imposed some radical changes to the Turkish economy. Like previous liberalisation episodes (i.e. 1950-53 and 1970-73), the liberalisation of 1980 was characterized by a devaluation of the domestic currency (in January 1980 the government devalued the lira from 47 to 70 per US dollar and the exchange rate has been adjusted on a daily basis since May 1981) and the institution of a macroeconomic stabilisation program. However, what distinguishes the 1980 reform program from earlier liberalisation attempts is that, "...for the first time the Turkish government demonstrated that it would use economic policies to create a more liberal market-oriented economy..." (Baysan and Blitzer, 1991).[3]

[3] Note that in a World Bank study on foreign trade liberalisation, Baysan and Blitzer (1991) focus on developments in the Turkish foreign trade sector between 1950 and 1984. They identify four attempts of trade liberalisation, namely the years 1950, 1958, 1970 and 1980. The authors conclude that the liberalisation was not sustained in the first three cases. Only the 1980 liberalisation attempt is viewed as the start of a more fundamental and sustained liberalisation. Unlike the earlier stabilisation packages of the 1950s and the 1970s, the 1980 program marked the beginning of a committed major program of economic liberalisation and trade reform. It is also worth noting that like all Turkey's previous liberalisation episodes (i.e. 1950-53 and 1970-73), its roots lay in balance-of-payments difficulties. During the late 1970s, inflation was accelerating, unemployment was rising, shortages were common, and labour unrest had reached crisis proportions. Even worse, political violence was widespread throughout the country. All these problems were becoming increasingly severe due to the economy's inability to

The eighties have witnessed a fundamental change of the composition of GDP in favour of industry. The industry's share has considerably risen during the first half of the 1980s while stagnated during the second half. In addition, the country's export earnings have increased considerably (see Table 3). There is little doubt that one of the most successful outcomes of the 1980 Turkish economic reform program was the remarkable growth in exports. As a result of continual real depreciations, output recovery was driven mainly by exports until 1986-87. While many of the countries with debt problems chose to run large non-interest current account (NICA) surpluses, mainly by cutting expenditures and growth, Turkey opted for a high growth strategy with less NICA surpluses known as "growth-oriented debt strategy" (see van Wijnbergen *et al*., 1992, p.160). This strategy sought to improve the debt-output ratio through output growth and permitted running lower external surpluses. Although this exchange rate policy raised the debt-output ratio through capital loses, it lowered the debt-exports ratio by increasing exports. Mainly due to this policy, Turkey's creditworthiness was restored, and the country was distinguished from most debtor countries whose debt-exports ratio rose in line with their debt-output ratios. During the 1980-88 period, the exchange rate strategy have been used actively for export promotion. Turkey's export performance has been impressive, especially in the first half of the 1980s. Some combination of the following factors can explain such a successful export performance:

a) a substantial real depreciation of the Turkish lira,

b) the introduction of new export promotion schemes and the improvement of existing ones, and

c) a significant reduction in domestic demand and the shift of production from domestic to foreign markets.

The policy of persistent real depreciation until late 1988 has been an essential component of the high growth strategy Turkey opted for solving its debt problem. The spectacular growth of exports and outward orientation of the Turkish economy, and expansion of production in tradables relative to nontradables are some of the achievements of the 1980 post-liberalisation period for which the exchange rate policy is to be credited for. Starting in late 1988, however, Turkish government implicitly started to use exchange rate as part of an anti-inflationary strategy, without committing themselves to an explicit plan (Asikoglu and Uctum, 1992). Some exogenous factors

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adjust to higher world oil prices, a lack of incentives for exports, irrationality in the import-licensing system, poor performance by the SEEs, and political instability.

together with the endogenous factors worsened economic conditions in the domestic market in the second half of the 1980s (Kazgan, 1993).

One of the major objectives of the liberalisation program was to bring a lasting solution to the chronic balance of payments problem through switching the productive capacity of the economy into the tradables sector. While this requires, in the short-run, the output level of tradables to expand relative to that of nontradables, sustaining the export-led growth, in the longer-run, needs increased fixed capital formation in the traded goods sector. Despite the achievements in the sectoral composition of production, a capacity increase in tradables has been missing. The view that the favourable export performance of Turkey in the 1980s appears not to have generated an increase in private investment in tradables is shared by many contributers (see, among others, Aricanli and Rodrik (1990), Conway (1990, 1991) and Uygur (1993). In short, the 1980 economic reform program has fallen short to induce the level of investment in the tradables sector required for the future growth of the economy.

We, like many others, view the 1980 liberalisation as the start of a fundamental and sustained liberalisation. As Dornbusch (1992, p.77) points out: "...The results of Turkish opening (and of accompanying domestic political and economic stabilisation and reform) are altogether striking...".[4] The liberalisation of imports and the capital account were, however, approached gradually and at later phases of the 1980 adjustment programme[5] nominal tariff rates were reduced remarkably; quantitative restrictions were abolished and bureaucratic controls over imports were also relaxed especially in and after 1983-84. However, import liberalisation process in the late 1980s led to an increase in the imports of consumer goods. Besides, capital account liberalisation appear to have contributed to the real appreciation of the Turkish lira. In 1990, further import liberalisation measures were introduced during a period of real exchange appreciation, with the result that there was a noticeable trade and current account deficit.

[4]Dornbusch (1992) also provides a good account for the case for trade liberalisation for LDCs.

[5]Relying on the theoretical framework for policy options for reducing anti-export bias by Milner (1990, esp. pp.92-4), one can reasonably suggest that the Turkish government, during the 1980s, has utilised the following policy options: a) raising "export subsidies", b) lowering the "effective protection of importables".

Table 3: Some Key Macroeconomic Indicators, the 1980s

	1975	1980	1983	1985	1987	1988	1989
Real GNP Growth (%)	8.0	-1.1	3.3	5.1	7.5	3.6	1.9
Inflation Rate[1] (%)	10.1	107.2	30.5	43.2	32.0	68.3	69.6
Total GFI[2] / GNP (%)	21.5	19.6	18.9	20.0	24.6	26.1	22.5
Total DS[2] / GNP (%)	19.6	16.0	16.5	18.9	23.9	27.2	22.1
PSBR [3] / GNP (%)	4.7	8.8	4.9	3.6	6.1	4.8	5.3
Export / Import Ratio (%)	29.6	36.8	62.0	70.2	72.0	81.4	73.6
Export [4] / GNP	2.9	4.2	9.2	11.7	11.6	12.8	10.7
Import [5] / GNP	10.0	11.6	15.3	17.0	16.5	15.8	14.7
Indust.Exp. / Total Exports	35.9	36.0	63.9	75.3	79.1	76.7	78.2
CAD [6] (billion $)	-1.65	-3.41	-1.92	-1.01	-0.81	1.6	1.0
Int. Reserves [7] (billion $)	1.2	1.21	2.1	3.28	5.21	6.43	9.3
TED[8] / GNP (%)	8.0	23.5	29.6	37.4	46.1	44.8	38.4
STD[8] / TED (%)	----	----	12.4	18.7	18.9	15.8	13.8
Debt Service[8] (billion $)	----	----	-3.83	-4.22	-5.52	-7.16	-7.17
FDI[9] Permits (million $)	----	97	103	235	655	821	1,512
FDI(9) Realisations (mill.$)	----	18	46	99	106	354	663

[1] Average annual change in wholesale price index.
[2] GFI: Gross fixed investment; DS: Domestic Savings
[3] PSBR: Public sector borrowing requirement.
[4] Exports of goods (fob).
[5] Imports of goods (cif).
[6] CAD: Current account deficit.
[7] Foreign exchange and gold reserves (net).
[8] TED: Total external debt; STD: Short-term external debt; Debt Service: External debt service (principal + interest).
[9] FDI: Foreign direct investments.
Source: SPO; SIS.

There is little doubt that the Turkish economy has achieved an impressive transformation from an inward-looking economy to an outward-oriented one (see Tables 3 and 4). In fact, Turkey is one of the few countries that managed to maintain high GNP growth in real terms (which is about 5% per annum in the 1980s), after rescheduling their debts in the 1980s. Turkey's recovery from its debt during the 1980s has been increasingly subject of investigation in recent years. The country has frequently been referred to as a 'success story' for other debtor countries [see e.g., Arslan and van Wijnbergen (1993), Aricanli and Rodrik (1990)]. Riedel (1988), in particular, citing the Turkish stabilisation programme implemented in the 1980s, argues that the outward-orientation of trade can boost export growth rates of LDCs. The most successful aspect of Turkish experience has, most probably, been the considerable growth in exports during the 1980s. Exports (FOB) rose from 2.9 billion US dollars in 1980 to 11.7 billion US dollars in 1988. The export composition changed in favour of manufactured goods and the export/import ratio improved (i.e. the share of manufactured goods in total export rose from 36% in 1980 to 77% in 1988). The export boom was mainly in manufactured goods. In addition to the leading subsectors like textiles and

clothing, iron and steel, several other subsectors also enjoyed remarkable expansion. Along with the manufactured sectors, many service export industries such as tourism, transportation and contracting also expanded their shares.

Table 4: Some Key Macroeconomic Indicators, the 1990s

	1990	1991	1992	1993	1994	1995	1996	1997
Real GNP Growth (%)	9.4	0.3	6.4	8.1	-6.1	8.0	7.1	8.0
Inflation Rate[1] (%)	52.3	55.4	62.1	58.4	120.6	88.5	74.6	81.0
Total GFI[2] / GNP (%)	22.6	23.7	23.4	26.3	24.5	24.0	25.0	25.3
Total DS[2] / GNP (%)	22.0	21.4	21.6	22.7	23.1	22.1	20.0	20.1
PSBR [3] / GNP (%)	7.4	10.2	10.6	12.0	7.9	5.2	9.0	9.5
Export / Import Ratio (%)	58.1	64.6	64.3	52.1	77.8	60.6	54.1	56.5
Export [4] / GNP	8.5	8.9	9.2	8.4	13.8	12.6	12.5	13.6
Import [5] / GNP	14.6	13.8	14.3	16.2	17.8	20.8	23.1	24.1
Indust.Exp. / Total Exports	79.9	78.6	83.5	83.4	85.7	88.2	87.4	89.6
CAD [6] (billion $)	-2.6	0.25	-0.97	-6.43	2.63	-2.34	-2.4	-2.75
Int. Reserves [7] (billion $)	11.4	12.3	15.3	17.8	16.5	23.9	25.0	27.1
TED[8] / GNP (%)	32.2	33.2	34.7	37.0	50.1	42.6	43.2	42.2*
STD[8] / TED (%)	19.4	18.1	22.8	27.5	17.2	21.4	25.7	25.4
Debt Service[8] (billion $)	7.3	7.5	8.3	9.2	9.4	10.0	9.9	4.7**
FDI[9] Permits (million $)	1,861	1,967	1,820	2,063	1,478	2,938	3.837	1.077***
FDI[9] Realisations (mill.$)	700	783	779	622	559	772	612	245**

* Ratio of debt stock as of end of June to estimated GNP for the whole year.
** January-June period.
*** January-September period.
[1] Average annual change in wholesale price index.
[2] GFI: Gross fixed investment; DS: Domestic Savings.
[3] PSBR: Public sector borrowing requirement.
[4] Exports of goods (fob).
[5] Imports of goods (cif).
[6] CAD: Current account deficit.
[7] Foreign exchange and gold reserves (net).
[8] TED: Total external debt; STD: Short-term external debt; Debt Service: External debt service (principle + interest).
[9] FDI: Foreign direct investments.
Source: SPO; SIS.

GDP growth was floating in 1992 and 1993, reflecting large real wage increases and lax macroeconomic policies. By the end of 1993, the economy was overheating. Domestic demand raised by about 12 per cent in 1993, import volumes jumped by 36 per cent and GDP grew by 8.1 per cent. Following years of high fiscal deficits and inflation in excess of 50 per cent a year, a sharp deterioration in public sector (PSBRs are 12 per cent of GDP in 1993) and external deficits caused a loss of confidence in the Turkish lira and a financial crisis in early 1994.

In the second half of the 1990s, Turkish economy has enjoyed high growth rates although high inflation rates and structural problems have remained unresolved (see Table 4). As we are in 2003 now, the Turkish economy has witnessed a new recession recently (in 2001). The major challenge facing the new government is to put the macroeconomic balances in order, to be able get rid of the ongoing recession, also to establish a credible strategy for achieving sustainable internal and external deficits,

lower inflation and sustainable economic growth in the medium term.

5. Review of the possible means of measuring trade liberalization over time for Turkey

There is little doubt that the most difficult aspect of empirically investigating the relationship between trade liberalisation and growth seems to be the empirical operationalisation of the concept of 'trade liberalisation'. The difficulty arises for both conceptual and practical reasons. Trade liberalisation may embody a number of different aspects of policy reform. Liberalisation may imply less intervention by governments in the traded goods sectors. Whether a less interventionist trade regime results in a less distorted, more open or outward oriented economy will depend critically on the detailed characteristics of the pre- and post-reform trade and exchange regimes and their impacts on the pattern of incentives and production. Different aspects of trade liberalisation are likely to impinge on the interventionism, neutrality or openness of a reforming economy. Many countries may employ a wide array of interventions in the traded goods sector; import tariffs and non-tariff controls in the importables sector, export taxes and subsidies in the traditional and non-traditional export sectors respectively and uniform or non-uniform over-valuation of the exchange rate. Removal of non-binding non-tariff barriers may be indicative of a less interventionist regime, but no greater neutrality or openness is implied. Alternatively lowering of binding non-tariff barriers combined with a uniform exchange depreciation may increase the neutrality of the regime, without increasing the actual openness of the economy. Even if we abstract from such theoretical complications (since there is often considerable scope for reforming trade regimes so as to make them less interventionist, more neutral and more open), it is invariably difficult to measure any aspect of trade liberalisation in summary fashion; the measurement and data problems being fashioned by the country-coverage and especially time-dimensions of the study.

Openness measures

Simple trade volumes (X, Y, X+M) or trade/GDP(Y) ratios (M/Y, X/Y, or (X+M) / Y) have often been employed as crude indicators of openness. Comparisons across countries can of course be particularly misleading. This has led authors such as Leamer (1988) and Edwards (1992) to take differences between 'predicted' and actual trade intensity ratios to proxy the extent of trade barriers. The predicted trade flows are

derived from Leamer's Heckscher-Ohlin model (Leamer, 1984), estimated from cross-country data on factor endowments. The unavailability of time series data on endowments for individual countries prevents the use of this type of approach in the present work. We fall back by necessity on crude trade intensity ratios[6] and export volumes, and assume that such openness measures are directly related over time to the degree of trade liberalisation initiated.

Trade and other distortion measures

Some information on tariff barriers can often be obtained across countries and over time. The calculation of average collection rates (import duties relative to the value of imports) is of limited information content. In any case non-tariff barriers are often more important forms of protection in developing countries. Tariff-equivalence and the effective protection impact of such NTBs is likely to be available for one or two years at best. Data on the import coverage of NTBs is sometimes used as indicators of their severity, but such ratios are not good indicators of the restrictiveness of trade barriers.

The above problems and the desire to capture a wide range of price distortions have encouraged attempts at the constructing of composite indices of distortion (Agarwala, 1983). Subjectivity is required to rank the distortions from different sources. The Agarwala results are cross-country in nature, and inappropriate for the present work. Efforts to replicate the approach for time series work would be constrained by data availability, and would be open to inevitable criticisms concerning personal bias.

In this work we prefer therefore to use information on the black market, exchange rate premium to capture the extent of distortions. The deviation between the black market rate and official exchange rate, expressed as a proportion of the black market rate and named "exchange rate distortion index", seeks to capture the effects of trade and other interventions (e.g. capital market); the greater the deviation the more distorted the economy or a reducing deviation being interpreted as increased liberalisation.

Measures of bias or trade orientation

Early work on trade regimes by, for example, Krueger (1978) and Bhagwati (1978) emphasise overall trade orientation i.e. the degree to which the protective/incentives structure in a country is biased against exports. This is the tradition followed also by the World Bank comparative study for trade liberalisation episodes

[6] Exports plus imports relative to real GDP per head and taken from the Penn-World data set.

(Michaely *et al.,* 1991), in which trade liberalisation is viewed as a move toward neutrality. In that study the country authors were required to assess each liberalisation on a subject scale of the degree of liberalisation. (The scale ranges from 1 to 20; where 1 corresponds with the most restricted trade regime and 20 with free trade.) This subjectivity has been strongly criticised, particularly as a means of comparing liberalisation episodes across countries (Edwards, 1993; Greenaway, 1993).

We need some measure of the ratio of the exchange rate facing importers to that effectively faced by exporters (as effected by official exchange rates and any taxes and subsidies on traded goods). Detailed structure of protection studies have given snap-shots at specific points of time of such measures of bias. There is also some cross-country information on the bias between non-tradeables and tradeables as a whole to be found in Dollar's work on real exchange rates (Dollar, 1992). The present work is investigating the possibility of constructing real exchange rates (as defined as the price of tradeables to non-tradeables) for importables and exportables separately on a time series basis, since this avoids the potentially ambiguous response of the real exchange rate for all tradeables to trade liberalisation (see Milner, 1994). At present the analysis is restricted to using an openness and distortion index only.[7]

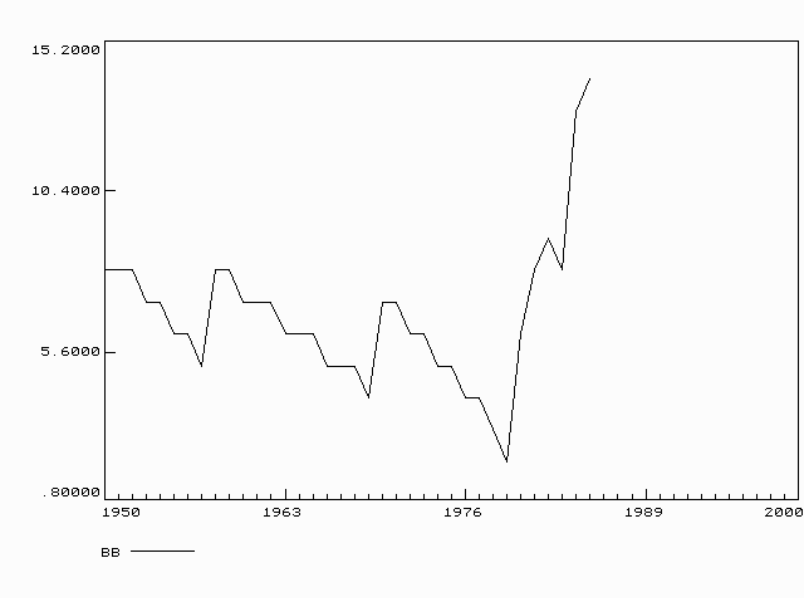
Trade liberalisation in Turkey

In the World Bank study on liberalising foreign trade, Baysan and Blitzer (1991) focus on developments in the Turkish foreign trade sector between 1950 and 1985. They identify four dates over this period when marked attempts to reduce trade and other distortions were initiated, namely the years 1950, 1958, 1970 and 1980. In the first three cases the authors conclude that the liberalisation was not sustained, and the reforms were not part of a planned programme to establish a liberal trade regime. Indeed, in none of these brief liberalising episodes do Baysan and Blitzer assess the reforms to have been sufficient to merit the status of an 'outward-oriented' regime. By contrast the 1980 liberalisation is viewed as the start of a more fundamental and sustained liberalisation; the index is set at 6 (within the restrictionist trade regime range) in 1980 and rises steadily to 14 (well into the 'outward-oriented' range) by 1985 (see Figure 1). The series of reforms started a near 50 per cent devaluation, increase in direct export incentives, demand stabilisation measures, and a declared intention to gradually liberalise the economy (dismantling the QR system, capital account liberalisation). Besides the

[7] There is, in any case, some overlap between the alternative indices, and the indices used here may also capture the effects of trade regime bias.

introduction of direct export incentives at the start of the episode, the Bank's view was that relatively little was achieved in terms of import policy until 1984. Some commodities were shifted from the more restrictive to the less restrictive list, and in 1981 some licensed imports were liberalised and the explicit import quota system was abolished. The system remained dominated by licensing, QRs and a protective tariff structure until the beginning of 1984, when about 60 per cent of previously licensed imports were liberalised. There were also changes in the administrative system; only goods explicitly listed as prohibited could not now be imported, where previously imports were banned if not explicitly listed as liberalised (for further details see Kazgan, 1993).

Figure 1: Baysan and Blitzer Index (BB) of Liberalisation for Turkey



How does the 'Baysan-Blitzer' (BB) index of liberalisation for Turkey compare with the indices of openness and distortion used in the present work? Figure 2 plots the BB and openness indices alongside each other. There is in fact a fairly close correlation (+0.678) between the two indices (See Table 5 for the correlation between various indices). The liberalisations of 1950, 1958 and 1970, and the subsequent reversals are captured. The timing and scale of the liberalisation episode starting in 1980 is also dramatically represented by our openness index. Note that the openness index continuously rises from 1979 (12.9) up to 2000 (65.2). By contrast the exchange rate

distortion index or ERDI (see Figure 3) does seem to pick up the two steps (that is 1980 and 1984) in the post-1980 liberalisation; the black market premium falling sharply between 1979 and 1980 and falling further and sharply again between 1983 and 1984. Note also the re-emergence of the premium in the 1985-88 period, a reversal which is not as evident from the openness index. For the period (1955-90), however, our two indices (ERDI and OPEN) correlate fairly closely (-0.68); the distortion index also capturing the 1958 and 1970 temporary liberalisations fairly well. (The export and import volume indices - see Figure 4 - also captures the transitory nature of the earlier liberalisation, but records a continuous liberalisation after 1980.)

Figure 2: BB and Openness Indices

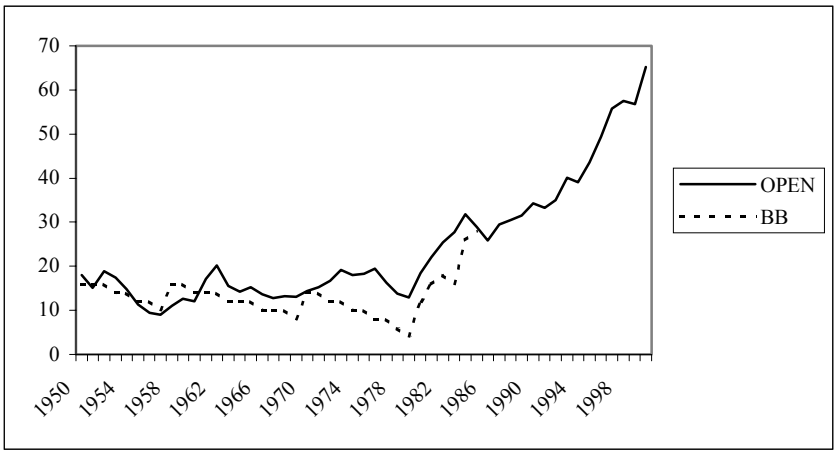
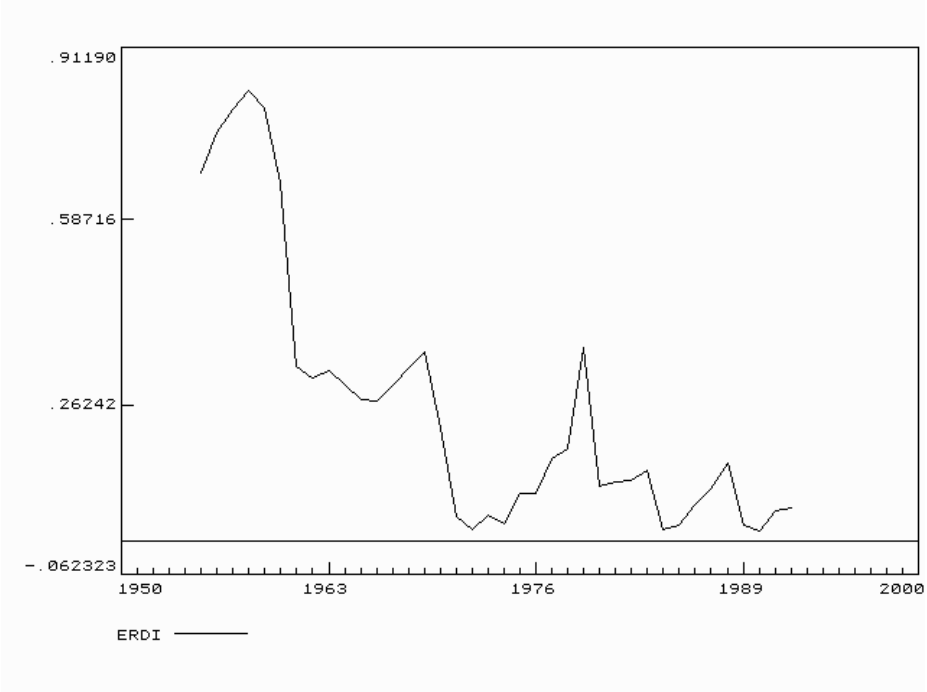


Table 5: Correlation between various openness indices

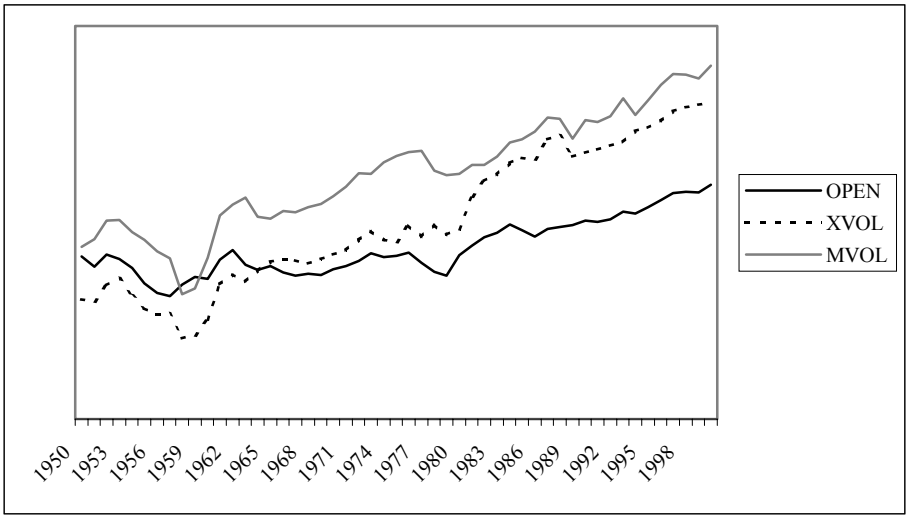
	BB	OPEN	ERDI	XVOL	MVOL
BB	1	0.67813	-0.12593	0.66969	0.29055
OPEN	0.67813	1	-0.68287	0.91386	0.80835
ERDI	-0.12593	-0.68287	1	-0.59025	-0.81258
XVOL	0.66969	0.91386	-0.59025	1	0.81244
MVOL	0.29055	0.80835	-0.81258	0.81244	1

Figure 3: Exchange Rate Distortion Index (ERDI) for Turkey



The consistency between openness and distortion indices and between these and the subjective index provided by Baysan and Blitzer is reassuring. If trade liberalisation does affect economic growth in the way hypothesised in section 2, then the indices appear to be sufficiently adequate measures of liberalisation to capture these growth effects in the subsequent econometric analysis.

Figure 4: Export Volume, Import Volume and Openness Indices for Turkey



6. Econometric Methodology

Cointegration and Granger causality between variables and the short-run dynamic adjustment towards the long-run equilibrium path is to be examined. the appeal of the cointegration analysis for economists is that it simply provides a formal framework for testing and modeling long-run economic relationships from actual time series data.
This involves the 'two-step procedure' suggested by Engle and Granger (1987) (EG hereafter). As a first step, we estimate the following cointegrating regressions by ordinary least squares (OLS):[8]

$$X_t = \alpha_0 + \beta_0 Y_t + \mu_t \qquad (7a)$$

$$Y_t = \alpha_1 + \beta_1 X_t + \mu'_t \qquad (7b)$$

where α_0 *and* α_1 represent the intercept terms while μ_t and μ'_t are the error terms.

First we check for the cointegrating properties of the series involved. The next step is to test which variable Granger causes the other one,[9] using error-correction models (ECMs) to see if the coefficient of the error-correction term is statistically significant or not.[10] Accordingly, the ECMs are formulated as follows:

$$\Delta X_t = a_0 - b_0 \mu_{t-1} + \sum_{i=1}^{m} c_i \Delta X_{t-i} + \sum_{j=1}^{n} d_i \Delta Y_{t-j} + e_t \qquad (8a)$$

$$\Delta Y_t = a_1 - b_1 \mu'_{t-1} + \sum_{i=1}^{q} e_i \Delta Y_{t-i} + \sum_{j=1}^{r} f_i \Delta X_{t-j} + e'_t \qquad (8b)$$

---

[8] As OLS is super consistent in the cointegrating regressions, asymptotically it is not relevant whether these regressions are normalised on X or Y. In finite sample, however, the normalisation may matter, and we consider both possibilities. Note that in thesingle equation multivariate cointegration analysis, we employ recent methods suggested by Inder (1993), i.e. unrestricted fully modified ECM estimator, and by Phillips and Hansen (1990), i.e. fully modified OLS estimator.

[9] It has to be stressed that the concept of causality is a subject of controversy among economists. See e.g., Zellner (1988). In this paper, we use causality in Granger's sense. Following Granger (1969): Y 'causes' X if and only if X(t) is predicted better by using the past history of Y, together with the past history of X itself, rather than by using just the past history in the X variable. If Y causes X and X does not cause, we say that unidirectional causality exists from Y to X (i.e. Y → X). If Y does not cause X and X does not cause Y, we say that either Y and X are statistically independent or they are contemporaneously related, but they are not related in any other way. Finally, if Y causes X and X causes Y, we say that there is bi-directional causality (or feedback) between the two variables. For further discussion of the concept of Granger causality, see e.g. Pierce and Haugh (1977).

[10] This is known as the Granger Representation Theorem (GRT). See Engle and Granger (1987). According to the GRT, if two time series are cointegrated, then there exists an error-correction representation (i.e. error-correction mechanism is well determined) and vice versa. Note that in small samples, statistically significant estimates of b in equations (8a) and (8b), provide further evidence that the variables in (7) are indeed cointegrated.

where μ_{t-1} and μ'_{t-1} are the lagged estimated residuals (i.e. error-correction terms) derived from the static cointegrating regressions (*7a)* and (*7b)* respectively. The term Δ represents the first differences. Statistically significant b_0 and b_1 suggest that *Y* Granger causes *X* and *X* Granger causes *Y* respectively.[11] The ECMs introduce an additional channel through which Granger-causality could be detected since if two variables are cointegrated, causality must run in, at least, one direction between them. This causal relationship between the two variables provides the short-run dynamics necessary to obtain long-run equilibrium (Granger, 1988). For instance, focusing on equation *(8a), Y* is said to Granger cause *X* not only if the d_i 's are jointly significant, but also if b_0 is significant. Thus, in contrast to the standard Granger test for causality, the ECMs allow for the finding that *Y* Granger causes *X*, as long as the error-correction term, μ_{t-1}, carries a significant coefficient even if the d_0i's are not jointly significant (Granger, 1988). Jones and Joulfaian (1991) support the interpretation that the changes in the lagged independent variable describes the short-run causal impact, while the error-correction term introduces the long-run effect. However, if the two variables are not cointegrated, then the error-correction terms are dropped from the ECMs and the standard Granger test for causality is carried out.

We apply the integration and cointegration analyses in the EG sense; that is, a time series, say, X_t is said to be integrated of order *d* if, after differencing *d* times, it becomes stationary, denoted as $X \sim I(d)$. Moreover, two time series, X_t and Y_t are said to be cointegrated of order *d, b* where $d \geq b \geq 0$, denoted as

$X_t, Y_t \sim CI(d, b)$ if:

a) both are *I(d)*, and b) their linear combination $\alpha_1 X_t + \alpha_2 Y_t$ is $I(d - b)$; that is, the residuals of the long-run regression should be stationary (i.e. integrated of order zero). The vector $[\alpha_1, \alpha_2]$ is referred to as the 'cointegrating vector'.

The static cointegrating estimates with small samples need very cautious evaluation. Due to nonstationarity of the variables and thus nonnormal distribution, test statistics of the EG type of static cointegrating regression may be biased upward and thus no judgement on the statistical signifigance can be made using standart critical value tables. Ad regards the cointegrating EG regression estimations, as a rule, the higher the R^2 statistic, the less biased the estimated static long-run estimates are. The EG type of static cointegrating regression has become a widely applied method since 1987. One of

[11] Note that joint significance of the error-correction terms b_0 and b_1 could be a matter of debate.

its benefits is that the long-run equilibrium relationship can be modelled by a simple regression involving the levels of the variables. The estimates of the EG type static cointegrating regression parameters are superconsistent, i.e. it converges to the true value at a rate faster than in normal asymptotics (see Stock, 1987).

There exists, however, concerns regarding the static cointegratin regression. Some (e.g. Banerjee *et al.,* 1986) emphasise that small sample size is likely to create two main concerns regarding the static cointegrating regression: (i) possible bias in the long-run estimates, (ii) low power of cointegrating statistics. That is, although the dynamics are asymptotically irrelevant in the first step of the EG type of modelling, ignoring the lagged terms (dynamics) may lead to subtantial bias in finite samples.Others (esp. Park and Phillips, 1988) are more sceptic about the fact that the OLS estimator in the first step has an asymptotic distribution which is nonnormal and depends on nuisance parameters. This makes inference difficult, and the standart t-statistics vill not even be valid asymptotically.

Since these two groups of critics emphasize different aspects of the problem, they naturally recommend different solutions. Banerjee *et al.* (1986) and many others are in favor of estimating long-run parameters in an unrestricted error correction model (ECM) form, including all the dynamics. Stock (1987) also recommends this, describing the estimator as nonlinear least squares (NLS). Phillips and Hansen (1990) (following Park and Phillips, 1988), on the other hand, advocate using semiparametric corrections to the OLS estimator to eliminate dependency on nuisance parameters, and also to provide an estimator which follows a normal distribution asymptotically. They refer to this as "the fully modified OLS estimator".

Recent papers by Phillips and others have claimed a strong case for modified OLS in preference to what Inder (1993) describe as the unrestricted ECM estimator. Phillips (1988) shows that the latter approach is not asymptotically optimal, as it takes no account of the possible endogeneity of the explanatory variables. A Monte Carlo study reported in Phillips and Hansen (1990) showed the ECM estimator to perform fairly well compared with modified OLS, but t-statistics on the long-run parameters can be quite misleading in the former case.

Inder (1993) makes the following contributions to the debate: i) it is shown that Phillips and Hansen (1990) Monte Carlo design is biased in favor of modified OLS, and when a more realistic Monte Carlo is undertaken, the unrestricted ECM estimator performs far better than OLS or modified OLS; ii) the semiparametric corrections

applied to OLS can also be applied to the ECM estimator, giving a fully modified unrestricted ECM estimator which is asymptotically optimal; iii) the effects of endogeneity on the bias and distribution of the ECM estimator are minimal.

In the present paper, we empirically investigate the multivariate version of the relationship stated, i.e. single equation multivariate cointegration analysis. Here, we mainly rely on the econometric methodology of the EG outlined above with some necessary corrections / modifications to deal with the nuisance parameter and the endogeneity problems, i.e. fully modified unrestricted ECM (Inder, 1993), and fully modified OLS estimator (Phillips and Hansen, 1990). One drawback of the EG type of single equation modelling is that it assumes uniqueness of the cointegrating vector. However, in a multivariate context the number of cointegrating vectors could be more than one (i.e. $r > 1$). If $r > 1$, there is no longer a unique long-run relationship towards which the error-correction model (ECM) is adjusting. In this case, a single equation cointegrating regression will estimate the linear combination of the existent vectors. Although the existence of multiple cointegrating vectors is seen as an identification problem, applied researchers overcome this problem by choosing the cointegrating vectors which makes 'economic sense'. This implies choosing the cointegrating vector where the estimated long-run elasticities correspond closely (in both magnitude and sign) to those predicted by economic theory.

Single equation based cointegration approaches have two main drawbacks in common: first, they all assume the unique cointegrating vector; second, explanatory variables in the cointegrating vector are assumed to be “weakly exogenous”. Otherwise, long-run estimates suffer from “endogeneity” bias. Johansen (1988) and Johansen and Juselius (1990) provide a system-based VAR approach to overcome these difficulties. The main advantage of the Johansen Maximum Likelihood (ML) VAR method is that it enables one to determine the number of existing cointegrating (i.e. long-run) relationships among the variables in hand. It provides not only the direct estimates of the cointegrating vectors but also enables researchers to construct tests for the order (or rank) of cointegration, r. It is worth noting that, in a VAR model explaining N variables, there can be at most $r = N-1$ cointegrating vectors. It is commonly acknowledged that the statistical properties of the Johansen procedure are generally better and the cointegration test is of higher power compared to the EG one (Charemza and Deadman, 1997). It is, however, important to point out that they are grounded

within different econometric methodologies and thus can cannot be directly compared. *In this regard, the Johansen method can be used for single-equation modeling as an auxiliary tool, testing the validity of the endo-exogenous variable division. This may also be used as a confirmation test of the single-equation model.* Following Charemza and Deadman (1997), we believe that single-equation-based and systems-based methods should be seen complementaries rather than substitutes. Let us assume that the Johansen results suggest the existence of unique cointegrating vector. Then, if the estimated cointegrating coefficients have economically sensible signs and are roughly similar in size to those estimated by, say, the EG method, this could be taken some confirmation of the single-equation model to which the EG method was applied.

Despite its theoretical advantages, the Johansen estimating procedure is, in practice, also subject to some shortcomings. First, given the small sample size, the method cannot be accepted as an appropriate one since the point estimates obtained for cointegrating vector, may not be particularly meaningful. Second, some additional problems occur if we do not have a unique cointegrating vector. The problem of multiple long-run relationship is presumably best seen as an identification problem (Granger, 1986), and can be resolved in, basically, two ways: either rejecting all but one such cointegrating vectors as economically meaningless or if the model is consistent with the underlying economic theory, it should consists of not one but two or more single equations. In this respect, Phillips and Loretan (1991) favor for the use of equation-by-equation approach of the single-equation error-correction model since such a possibility is not available in complete systems-methods such as the Johansen approach.

In this study, we employ a multivariate single-equation type model.[12] The validity of conditional models relies on the exogeneity of the variables on which we condition. Alternatively, if they cannot be treated as weakly exogenous, then one should use the appropriate correction mechanism to tackle the endogeneity bias. A number of tests for weak exogeneity in cointegrated variables have been proposed in recent years (for an

[12] It is important to note that the choice between system-based models and conditional (single-equation) models is not straightforward, and is also open to debate. Urbain (1993) points out that if some exogeneity conditions are satisfied, a single equation models, from a practical point of view, enjoy nice asymptotic properties.

evaluation of these tests and definitions, see Urbain, 1993). Among them we follow the EG (1987). Within their two-step framework, EG argues that a simple way to check the weak exogeneity of, say, explanatory variable X_t for the long-run and short-run parameters of interest is to estimate an ECM for X_t and test the statistical significance of the error-correction term using a traditional t-test. If the t-test is significant, then X_t can no longer be treated as weakly exogenous.[13]

7. Empirical Findings

Data

In the light of the econometric methodology developed in the earlier section, we now apply the cointegration analysis and the ECMs to examine the relation between real GDP per capita (YPC hereafter) and our openness index (OPEN hereafter) in Turkey. We examine two more relationships by replacing OPEN with our intervention index (i.e. exchange rate distortion index: ERDI hereafter) and volume of exports (XVOL hereafter) in Turkey using the same econometric methodology. We use annual data for the period 1950-2000 for our our single equation multivariate cointegration analysis with ECM. In this multivariate case, the additional variables, in accordance with the 'endogenous' growth theory, are the measure of human capital (proxied by the secondary school enrolment rates: HC hereafter) and the measure of physical capital proxied by real gross domestic investment (private and public) as percentage of real GDP per capita. (PC hereafter). Data definitions, data sources and further information for YPC, OPEN, ERDI, XVOL, HC and PC are provided in Appendix 1. We use the natural logarithm of the relevant variables (prefixed with the letter L), since their first differences reflect the rate of change of each variable.

Integration (Dickey-Fuller) and cointegration (Engle-Granger) analyses: standard approach

In the light of the 'new' growth theory and the econometric methodology outlined, we now examine the multivariate cointegration and causality issues among the variables considered. Accordingly, we include a measure of physical capital (i.e. real gross domestic investment as percent of real GDP per capita) and a measure of human capital

[13] The standard orthogonality tests (such as the Hausman test) in the presence of cointegrated variables may well be invalid due to nonstationary nature of the variables in levels, and the null hypothesis is usually not sufficient for weak exogeneity in cointegrated models (for this point, see Urbain, 1993).

(i.e. secondary school enrolment rate) in Turkey as additional explanatory variables in the cointegrating regression.. We are mainly interested in analysing the following multivariate relationship:29

$$YPC = f(PC, HC, OPEN)$$

Following the methodology for multivariate analysis set up in the earlier section, we now express this longrun relationship as a regression in natural logarithms:

$$LYPC_t = \alpha_0 + \alpha_1 LPCt + \alpha_2 LHCt + \alpha_3 LOPEN_t + \mu_t \qquad (9)$$

where α_0 and μ_t are the intercept term and the residuals respectively. For the variables in (9) to be cointegrated, they need to be I(1) as a necessary condition (but not sufficient).

Table 6: The ADF test for integration level

Variables	Test Statistic	
	levels	first differences
LYPC	-3.23(1)	-5.67(1)
LOPEN	-3.25(2)	-4.99(1)
LERDI	-2.99(2)	-4.78(1)
LXVOL	-3.27(0)	-5.31(1)
LPC	-3.19(1)	-4.52(1)
LHC	-1.70(-1)	-3.91(1)

Note: Intercept term and time are included in the ADF equations. The corresponding critical value is –3.50 and obtained from MacKinnon (1991). Figures in parantheses show the number of augmentation that sufficient to secure lack of autocorrelation of the error terms.

A sufficient condition for a joint cointegration among the variables now is that the error term, μ_t should be stationary. The residual-based ADF test statistic for μ_t ensures that we reject the null of no cointegration at 10 per cent significance level (see equation 10). Following is the estimation result of the EG cointegrating regression (9) by OLS:

$$LYPC_t = 7.84 + 0.11\ LPCt + 0.29\ LHCt + 0.10 LOPEN_t + \mu_t \qquad (10)$$

$R^2 = 0.97$ RSS = 0.07
ADF = -5.22 (corresponding critical value at 5% is –4.33)
Sample: annual data (1950-2000)
(t-statistics are not reported since they are not valid due to nonnormality as explained earlier.)

Note that the estimated t-statistics and other standard test statistics in (10) have only a descriptive role since the variables are non stationary [Banerjee et al. (1986)]. Since the residual-based ADF test statistic –5.22 is smaller than the corresponding

critical value –4.33 at 5% statistical signifigance level, we can reject the null of no joint cointegration among the variables against the alternative.

Integration with break (Perron) and cointegration with break (Gregory-Hansen)

The results in Table 6 suggest that all the variables appear to be stationary in first differences, i.e. I~(1). These results are validated despite some structural changes. Our Perron unit root test results are available on request (for the method see Perron 1990; Perron and Vogelsang, 1992).

Since there is a regime shift in Turkey after 1980 from an inward-looking economy to an outward-oriented one, we test for cointegration with breaks using the methodology suggested by Gregory and Hansen (1996). This methodology examines the presence of cointegrated relationship under possible regime-shifts and use suggest three different models. In this paper we prefer the model 3, i.e. regime shift (C/S) (see Gregory and Hansen, 1996, 103). Using the model with regime shift (C/S) one gets some tests statistics including ADF^*. The corresponding critical values are obtained from Gregory and Hansen (1996, 109). Regarding our analysis, the ADF^* test statistic provides empirical support for the presence of cointegration with possible breaks among the variables concerned. Using model 3 with regime shift (C/S), we calculated ADF^* test statistic.[14] The calculated ADF^* statistic, -5.75, is significant at 10%.

Split sample investigation

As regards the regime change in 1980 on the long-run estimates, we step forward by spliting the whole sample into two, i.e. 1950-1980 and 1980-2000 and check whether the sign and the magnitude of the estimate change remarkably by using the same variables and the same estimation method. Results for the openness variables are especially worth pointing out. For the period 1950-1980 the only but remarkable change is the finding of negative sign for variable LOPEN. The corresponding t-statistic is still high. For the period 1980-2000 confirms the whole period estimation for the variable LOPEN, that is positive sign and high t-statistic. This evidence suggest that during the inward-oriented import substitution policies due to protectionism and intervention there exists a negative causal relationship between openness and real GDP per capita. After 1980s however export-oriented policies with more trade orientation the estimated sign change to positive, which means more liberalisation has led to an increase in growth.

[14] In order to calculate the ADF^* test statistic of Gregory and Hansen (1996) we employed the algorithm written in excel by Güneş and Ural (2003).

Due to sample size we feel that split sample estimates need cautious evaluation (results are available on request).

Unique cointegrating vector (Johansen, VAR)

We now test if this is the only cointegrating vector or not by applying the Johansen ML VAR test procedure (Johansen, 1988). Our results confirm the unique cointegrating vector (results are available on request). Note that in (10) we have economically meaningful estimates with expected signs.[15] Relying on this evidence, we can reasonably be sure that we are estimating the unique cointegrating vector. It is also important to point out that we empirically used different proxies for both openness / trade liberalisation to capture the different dimensions of the trade liberalisation that already explained in earlier sections, such as ERDI, XVOL, MVOL and re-estimated cointegrating regressions. Different measures of trade liberalisation performed well, and corresponding empirical findings are competible with the estimates in the long-run regression (10) and results are available on request.

Nuisance parameters (Phillips-Hansen), endogeneity (Inder), and a comparison of different approaches

However, the long-run OLS estimators are still biased if the explanatory variables are not weakly exogenous. Only if they are weakly exogenous, we can assume away the 'endogeneity bias'. If not, an appropriate correction for OLS estimators will be necessary. As mentioned earlier, EG argue that a simple way to check the weak exogeneity of, say, explanatory variable X_t for the longrun and shortrun parameters of interest is to estimate an ECM for X_t and test the statistical significance of the errorcorrection term using a traditional t-test. If the t-statistics is significant, then X_t can no longer be treated as weakly exogenous. Our calculations show that *LPC* and *LHC* in (10) are not weakly exogenous. Accordingly, we apply the fully modified ECM method to get the long-run estimators which are free from 'endogeneity' bias. Using the methodology suggested by Phillips and Hansen (1990), we obtain the fully modified OLS estimates:

[15] For a comparison of long-run estimates by using different methods, see Table 9.

Table 7: Fully Modified Phillips-Hansen Estimates (Phillips and Hansen, 1990) Equal weights, truncation lag= 2 , Trended Case

Dependent variable is LY
50 observations used for estimation from 1951 to 2000

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
Intercept	7.5796	.17002	44.5803[.000]
LPC	.13338	.054245	2.4588[.018]
LHC	.25052	.024943	10.0437[.000]
LOPEN	.16419	.041108	3.9940[.000]

In addition, using the methodology suggested by Inder (1993), we also get the fully modified unrestricted ECM estimates:

Table 8: Fully modified Unrestricted ECM Estimates (Inder, 1993)

Dependent variable is LYSTAR
49 observations used for estimation from 1952 to 2000

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
SBT	7.6746	.090323	84.9683[.000]
LOPEN	.12517	.022653	5.5254[.000]
LPC	.15452	.029647	5.2119[.000]
LHC	.25684	.013540	18.9691[.000]

It is important to point out that long-run estimates reported in Tables 7 and 8 are free from nuisance parameter effects and also free from the possible endogeneity bias. Note that long-run estimates in both tables are competible with the EG static estimates reported earlier. The reported t-statistics are now valid and can be evaluated in a usual manner. They all suggest that the explanatory variables are statistically significant at even 5% signifigance level. The following Table 9 reports the long-run estimates obtained by using different approaches. Results reported in theTable 9 suggest that our long-run estimates are quite robust. For better comparison, we added the long-run estimates of the Johansen ML (Johansen, 1988) and the asymptotically efficient dynamic estimates of the Saikkonen methods (Saikkonen, 1991).

Table 9: Estimates of our long-run relationship: a comparison of different approaches

Variable	Static EG OLS (Engle&Granger)	Fully Mod. Unr. ECM (Inder)	Fully Mod. OLS (Phillips&Hansen)	ML VAR (Johansen)	Dyn. OLS (Saikkonen)
LOPEN	0.10	0.13	0.16	0.13	0.19
LPC	0.11	0.15	0.13	0.22	0.06
LHC	0.29	0.26	0.25	0.22	0.25

Granger Causality Results with Error Correction Model

To show the multivariate causal effect, we now apply the Granger causality test. Since, after all, EG OLS estimates were shown to be robust, the estimated lagged residuals may still be used in the ECM as the error-correction term. Table 10 shows the Granger causality test results from the ECM.

Table 10: Granger causality test from error correction models: multivariate case

Dependent Variable	t-statistic for μ_{t-1}	F-Statistic for ΣΔLPC	F-Statistic for ΣΔLHC	F-Statistic for ΣΔLOPEN
ΔLYPC	-0.21^{η}	$7.65(3)^{*}$	$3.45(1)^{\eta}$	$6.78(1)^{*}$

Note: μ_{t-1} denotes the error correction term. Numbers in parantheses indicate the number of lags. Note that optimum number of lags are determined by applying general-to-specific methodology. Δ represent first differences.
* significant at 1% ; η significant at 5% .

We have evidence that LPC, LHC and LOPEN Granger cause LYPC through two channels: first, they jointly Granger cause LYPC through the significant error correction term and second, each variable has a Granger cause effect separately (see the joint significance F-statistics in Table 10). We have the long-run causal effect via the first one while the second causal effect has a short-run character (Jones and Joulfaian, 1991).

Estimation of the long-run relationship with breaks (Stock-Watson)

In this final step of the empirical work, we employ the methodology suggested by Stock and Watson (1993). The estimation is computed using OLS. The estimation is computed using OLS. Stock and Watson (1993) suggest that their long-run estimators (with breaks) perform better compared to other asymptotically efficient estimators. We report the estimation results in Table 11.

Table 11. Stock-Watson OLS model with breaks[16]:

$LYPC_t = \beta_0 + \beta_1 LOPEN_t + \beta_2 LPCt + \beta_3 LHC_t + \beta_4 DU_t + \beta_5 S1_t + \beta_6 S2_t + \beta_7 S3_t + u_t$

Parameter	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7
	8.01	-0.07	0.20	0.23	0.13	0.11	-0.13	0.22
	$(39.1)^{*}$	(-1.46)	$(3.73)^{*}$	$(8.55)^{*}$	$(2.68)^{*}$	$(1.89)^{\delta}$	$(-1.78)^{\delta}$	$(2.42)^{\eta}$

Notes: The numbers in parantheses are the corresponding t-statistics. $DU_t = 0$ up to 1976 and 1 thereafter. $S1t = 0$ up to 1980 and $S11_t$ * $LOPEN_t$ thereafter, with $S11_t = 0$ up to 1980 and 1 thereafter. $S2_t = 0$ up to 1980 and $S22_t$ * LPC_t thereafter, with $S22_t = 0$ up to 1980 and 1 thereafter. $S3_t = 0$ up to 1980 and $S33_t$ * LHC_t thereafter, with $S33_t = 0$ up to 1980 and 1 thereafter.

[16] Results are validated irrespective of the choice of the break years, i.e. 1980 and 1989 or 1980 and 1994.

Results reported in Table 11 suggest that the possible breaks in 1976 and 1980 are significant to a great extent, i.e. the dummies β_4, β_5, β_6, β_7 have statistically significant t-statistics. Regarding their effects on the estimators, we have mixed evidence. For physical and human capital proxies, estimated long-run coefficient are not only consistent with the earlier results computed by different long-run approaches but also have significant t-statistics. However, the long-run parameter estimate for the openness varaiable, LOPEN, has a negative sign with low t-statistic. This result is not in line with our earlier estimations with different methods. This result with openness variable shows that the relevant t-statistic turn out to be low when breaks are included. One needs further investigation for the 1990s in order to explain our cointegrating vector estimates with breaks and to reach a conclusive result.

8. Implications and Conclusions

The analysis provides evidence to support the 'endogenous' growth theory for the Turkish data. The evidence indicates joint causality between the rate of growth of per capita income and a number of indicators of trade liberalisation or performance. A relationship between openness and growth is theoretically plausible, while a causal link from declining trade distortions to growth is also consistent with the hypothesised role of trade policy in the 'new' growth theory. Trade policy affects growth in both the short and long run. In the case of the long run, the effect is conditional upon or simultaneously (jointly) determined alongside both physical and human capital accumulation effects on growth. This evidence of a joint, long run effect of trade policy and human capital on growth is particularly supportive of the 'new' growth models.

However, the policy change in the late 1980s and shocks in the 1990s might have caused instability and ineffectiveness on the Turkish growth in the long-run. This is we believe what might have happened since 1989, and in the 1990s: an unstable growth path with unsustainable deficits (external[17] and internal) and high inflation.[18] Indicators suggest (see Table 3, 4, and Figure 4) that the sustainable increase in exports in the 1980s has not sustained in the 1990s. The main factor in the export-oriented growth strategy is the requirement of sustainable increases in exports. Table 3, 4 and Figure 4, however, show that increases in imports have been sustained unlike exports, resulting in

[17] Real exports almost stagnated during the period.
[18] The dynamics of the relationship merit further investigation.

inreasing and unsustainable trade deficits[19] in Turkey. The policy of persistent real depreciation until late 1988 has been an essential component of the high growth strategy Turkey opted for solving its debt problem. The spectacular growth of exports and outward orientation of the Turkish economy, and expansion of production in tradables relative to nontradables are some of the achievements of the 1980 post-liberalisation period for which the exchange rate policy is to be credited for. Starting in late 1988, however, Turkish government implicitly started to use exchange rate as part of an anti-inflationary strategy. The major challenge for the new government is to put the macroeconomic balances in order, and to establish a credible strategy for achieving sustainable internal and external deficits with lower inflation in order to reach a sustainable economic growth.

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APPENDIX

Data Sources

The data used in this study are annual for the period of 1950-2000 and are taken from the following sources: openness indicator, OPEN, real GDP per capita, YPC and proxy for physical capital, PC are from Penn-World Tables. Secondary sch. Enr. Rates, i.e. proxy for human capital, XVOL and XVOL are from State Institute of Statistics (SIS). ERDI is from World Currency Yearbook.

Definitions of the Variables

YPC: Real GDP per capita of Turkey expressed in US dollars [source (vi)].

XVOL: Turkish exports of goods, volume index (1980=100) constructed on the basis of the formula XVOL = X$/PX$ where X$ where PX$ represent exports (fob) in US dollars and export price index in US dollar terms.

ERDI: Exchange rate distortion index of Turkey constructed on the basis of the formula ERDI = (BM$/OF$)/BM$ where BM$ and OF$ represent annual average black market and official exchange rates both expressed in Turkish Lira (TL) per US dollar. The

[19] Utkulu (1998) shows that there exists no long-run relationship between exports and imports, that is, growing (esp. in the 1990s) Turkish external deficits are not sustainable.

ERDI, in this study, is used as a measure of 'intervention'.

OPEN: Openness index of Turkey [defined as [(exports+imports)/real GDP per capita] expressed in US dollars.

HC: Measure of human capital of Turkey proxied by secondary school enrolment rates: (number of students enrolled at secondary schools/total population).

PC: Measure of physical capital of Turkey proxied by real gross domestic investment (private and public) as percentage of real GDP per capita.

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