

## **Relationship between Import-Led Exports and Economic Growth: The Experience of Turkey (1980-2008)**

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This paper, prepared in the framework of Feder model (1982) extended by taking account of recent relevant literature, analyzes the causality between exports, imports and economic growth in Turkey. According to regression results, it is found that exports are a significant determinant of economic growth. But, when adding imports to the model, the effects of exports become statistically insignificant. This finding can be interpreted as follows: in the case of Turkey, the export-led growth process has stemmed from imports. The above findings also are supported by the results of Toda-Yamamoto causality test using annual and monthly data. The empirical results show that in Turkey exports and accordingly economic growth are significantly affected by imports of intermediate and investment goods. The high interest - low exchange rate policy implemented in recent years in the context of inflation targeting policy has supported this process, which has its limits.

**Keywords:**

*International Trade, Import-Led Exports, Economic Growth, Panel Data Analysis*

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## Introduction

Following the Second World War most of the developing countries (LDCs) adopted an import-substitution industrialization strategy. Turkey first tried to implement liberal trade policies during the period 1950-1960 but started to implement an import-substitution industrialization strategy during the period 1960-1980. When implementing this latter development strategy it was hoped and expected that it would give rise to positive results such as acceleration of industrialization and savings of foreign exchange. But contrary to expectations, Turkey experienced acute foreign exchange shortages during the petroleum crisis of the '70s. Thus, by the end of the decade (1980), with widening balance of payments deficit and rampant inflation, it had become inevitable to change this strategy with the 24 January 1980 decisions and *stand-by* agreement with the IMF (Olgun, 1980:165). The said set of decisions changed Turkey's development strategy radically and shifted it away from an import-substitution industrialization strategy to outward-orientation of the economy and to export-led economic

growth. By this way, Turkey's foreign trade was largely liberalized. A high rate of devaluation was made, export premiums and import taxes were largely reduced, fixed exchange rate regime was waived and instead the Central Bank started to make daily adjustments of the exchange rate, most of the import prohibitions and restrictions were removed, including those on imports of consumption goods. At a later year, in 1984 foreign exchange rate was left free to be determined in the world market. Further, by 1996 Turkey entered Customs Union with the European Union (EU), hence gradually lowered the import duties on EU imports down to zero. Gradually also, Turkey adjusted her import

duties on non-EU imports to comply with the Common Customs Tariff of the EU. In addition, Turkey also accepted Free Trade Agreements that EU had signed with other non-member countries. Within this framework, Custom Tariff averaging about 4.2% began to be implemented by Turkey since 2005. Furthermore, liberalization steps accepted and recommended to members by the World Trade Organization were also put in force. Thus, since 1980 and 1996, Turkey's economy has begun to be integrated to the world economy.

Outward-orientation and export-led development strategy adopted by Turkey since 1980 caused, in time, considerable changes in the structure of the economy. Yet one of the results witnessed in Turkey as well as in many other LDCs was the increase in total imports and in the sub-categories of imports. Therefore, we intend to investigate in this research the impacts of subsequent developments in exports, total imports and imports of intermediate and investment goods on Turkey's economic growth, following the implementation of trade liberalization and outward-orientation.

In the second section of this research, the relation between the growth of Turkey's economy and growth of exports and of imports are examined. In the third section, a survey is made of the relevant literature and empirical research and their findings that establish the relationship between economic development, exports and imports in other LDCs or groups of LDCs. In the fourth section, the statistical and empirical methods of testing the relationships between growth, exports and imports in Turkey are surveyed and implemented. In the last section, along with a summary and conclusions, some policy recommendations are made based on the findings of this research.

## Relations between Imports, Exports and Economic Growth in Turkey After 1980

As a result of outward-orientation and export-led development strategy that began to be implemented since 1980, important structural changes started to take shape. For instance, exports registered a 62% growth in 1981 compared to the previous year; thus total exports as percentage to total imports rose from 36.8% to 52.6%. This positive development in exports continued throughout the period 1980-2007. The increase in exports following the economic crisis Turkey faced in 2001 is particularly noteworthy (Appendix 1).

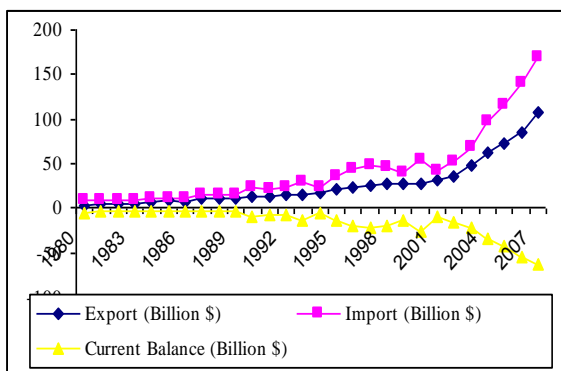


Figure 1 *Foreign Trade and Foreign Trade Deficit, 1980-2007*

On other hand, as can be followed from Figure 1, the volumes of exports and imports showed a similar pattern of growth throughout 1980-2007. A second important point that can be followed from Figure 1 is the gradual widening of foreign trade balance since 1996. To cite, foreign trade deficit as percent of GNP reached 10% before the 2001 crisis. With the crisis this percentage had fallen down to 5% in 2001. But following 2006 it began to widen again, reaching the pre-2001 crisis levels by 2006 and 2007. This can be interpreted as an indication that the Turkish economy has acquired a fragile structure.

During the period 1980-2007 we witness an ever-growing trend in total imports. Total imports also showed a

wavier course compared to total exports. The changes and developments in the percentage of total exports to total imports and its effects on GNP are also significant. For instance, during 1990 and 2001 when precipitous declines were registered in total GDP, imports showed significant declines as well. The relations between growth of GDP, exports and imports can be followed from Figure 2. Following the 2001 crisis, the growth of GDP, exports and imports began to display a parallelism.

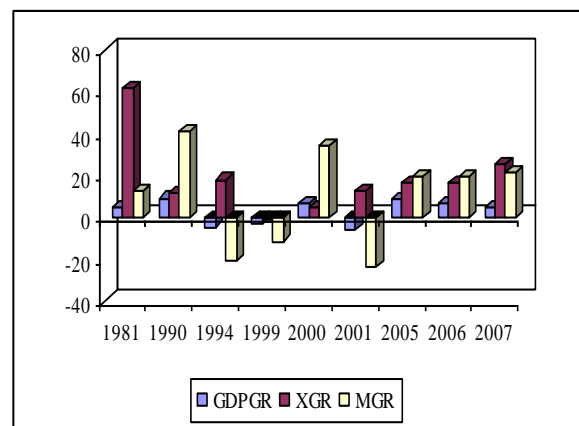


Figure 2 *Economic Growth and Growth of Exports and Imports*

When we investigate the structure of foreign trade, we find that the level of imports of raw materials and intermediate goods (RMM) is the greatest, followed by that of capital goods (investment goods imports: IM). For instance, in 1985 the major part of imports reaching 85% was comprised of energy inputs such as natural gas and petroleum while imports of investment goods, which should be judged as giving rise to technology transfer, remained at a low 10%. On the other hand, the share of imports of consumer goods that had remained below 10% since 1980 started to show an increase after Turkey entered the Customs Union with the EU in 1996 and rose above 10%. During the 1999 and 2001 economic crises that Turkey faced, absolute levels of all categories of imports declined. But the share of intermediate goods in total imports rose

while the share of investments goods decreased. This outcome probably stemmed from the fact that it is impossible to substitute intermediate goods that include energy sources such as natural gas and petroleum. In other words, during crisis years, while firms suspend their investment projects, they are obliged to import energy materials in order to continue with their present production level as much as possible (Appendix 2).

Figure 3 shows the relationship between the growth rate patterns of major categories of imports with the growth rate of exports and of GDP for the period 1990-2007. As can be followed from the diagram, there is a high level of parallelism between the growth rate of GDP (GDP GR) and that of investment goods (IMGR). With the growth of exports (XGR), according to growth rates calculated in terms of 1998 US dollar values, both rates were high until 1990. But although a high growth rate of total exports was registered in 1994, the growth rates of GDP and of intermediate goods as well as investment goods showed significant decreases and took negative values. With the economic crisis Turkey faced in 1994, the fall in imports of investment goods was much greater than that in intermediate materials. In 2000, on the other hand, though imports of both intermediate goods and investment goods increased considerably, the growth rate of GDP was much less.

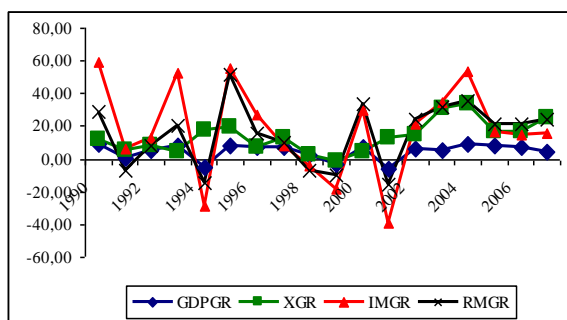


Figure 3 *Developments in International Trade and Economic Growth (1990-2009)*

In 2001 as in 1994, though there was a considerable rise in exports, there was a significant reduction in imports of investment goods and in economic growth and GDP level. Following the 2001 economic policies, therefore, the economy was stabilized and parallel to this stabilization the growth rates of GDP, exports and imports became simultaneous and about parallel. This can be interpreted as a strong indication that economic growth in Turkey under the research period covered is of import-led export and import-led growth character; so it requires empirical research.

### **Imports and Economic Growth: A Summary Review of Relevant Literature**

The discussions on the effects of international trade on growth in economic literature go as far back as D. Hume, A. Smith and D. Ricardo. The views of the classical economists that foreign trade increases welfare have been developed further by later economists and their influence is seen in the current literature. The theory of endogenous growth developed since 1980 has drawn our attention on the dynamic effects of trade liberalization, and thus has given us an explanation of growth triggered by productivity of production factors and accumulation of knowledge. On the other hand, post Keynesian approaches has given a heavier weight on aggregate demand and a special importance to the balance of payments limitations as well as savings and budget limitations to our understanding of the relationship between growth and foreign trade (Jayme, 2001:13-21).

Based on the above theoretical discussions, it seems difficult to reach at definite conclusions about the relationship between foreign trade (openness) and economic growth. Nonetheless, Berg and Krueger (2003:6) have summarized the possible channels between foreign trade

and economic growth as follows: (i) an increased efficiency of investment, particularly given the importance of imported capital goods in developing countries; (ii) an ability to expand at constant (rather than diminishing) returns for a longer period through access to larger markets (Ventura (1977)); (iii) a higher real return to capital in unskilled labor abundant countries that exploit their comparative advantage; (iv) the higher rate of domestic saving and/or foreign capital inflow that may be attracted by (i) and/or (ii); (v) a possible endogenous growth effects arising from more rapid short-term growth in response to trade opening; (vi) the discipline imposed on a government to undertake other pro-growth economic policy reforms if there is an open trade regime; (vii) the reduction in rent-seeking activities inspired by trade restrictions; (viii) the spur to innovation and entrepreneurial activity resulting from competition and access to larger markets; and (ix) openness to ideas and innovations generated by openness to trade.

The importance and effects of imports of capital goods on investments, accordingly, on exports and GDP in LDCs noted in (i) above form the basic hypothesis of this research. In more plain terms, obtaining of investment and intermediate goods at lower prices by means of importing them compared to their domestic production raises the growth rate and exports of LDCs according to the principle of comparative advantage. But, on the other hand, the consequent rise in total imports makes growth dependent on imports. Therefore, in those countries that cannot create sufficient foreign exchange, it may cause balance of payments deficits and increase the fragility of the economy. The other factors which increase the fragility of the economy are the (fake or temporary) growth dependent on imports, in particular, based on under-valued foreign exchange/ over-valued domestic currency policies supported by high

interest rates; and the impossibility of continuing with this policy indefinitely.

As the first step in economic literature, the effects of exports on growth in LDCs had been taken up by several researches. The initial studies on the subject were carried by such researchers as Emery (1967: 470-486) and Kravis (1970:850-870). They had concentrated on the correlation between these two parameters. Later, these analyzes were further developed by Michaely (1977:49-53) and Heller and Porter (1978:191-193) by taking into account further relevant variables. In the earlier part of 1980's, on the other hand, Tyler (1981:121-130) and Feder (1982: 59-73) have made estimates of the neo-classical production function that treats exports as the explanatory variable. Soon appeared research made by Jung and Marshall (1985: 1-12) and Chow (1987: 55-68) using new statistical methods such as time series and co-integration analyses. As different from previous research, the latter-mentioned research aimed at investigating "causality". Along with globalization, the relationship between growth and exports became a more popular topic, and there was an evident increase in the volume of research in the 1990's that analyzes different countries (LDCs), using different time-series analysis methods. For a detailed survey of all this literature, refer to: Ahmed and Kevan (1991, 243-248), Edwards (1993: 1358-1393), Ghartey (1993: 1145-1152), Greenaway and Sapsford (1994a: 152-174) and 1994b: 175-186), Love (1994: 203-218), Ghadak et. al. (1997: 213-223), Giles and Williams (2000: 261-337) Medina-Smith (2001) and Subasat (2002: 333-349).

In the research that accentuated exports as the locomotive of growth it was asserted, in particular, that exports trigger increases in productivity and give rise to economies of scale. The literature and research on the relationship of exports and income growth, which use cross-sectional analysis, give strong findings concerning

the existence of this relationship. But time series analyses give us contradictory results. Based on all these researches that test the relationship between exports and income growth we may reach the conclusion that the relationship between exports and growth is positive and statistically significant for those countries that have reached a certain level of growth and development.

The view that imports, particularly imports of investment and intermediate goods that form a channel for transfer of technology in LDCs, and the relationship between imports and GDP were taken up more recently in the economic literature and tested.

Many researchers extended the exogenous growth models developed for closed economies by Romer (1986: 1002-1037) and Lucas (1988: 3-42) so as to include open economies. According to Lee (1995, 92) one of the key lessons we can derive from literature dealing with the relations of international trade with growth is that imports of foreign inputs is an important determinant in establishing the relationship between foreign trade and growth. Grossman and Helpman (1991), Rivera-Batiz and Romer (1991) and Quah and Rauch (1990) showed that foreign trade increases growth rates by means of the diversity of imports of intermediate inputs which induce more research and development and learning-by-doing. (Lee, 1995: 92). Similarly, Mazumdar (1996: 1329) points out that in those LDCs that import investment goods, the relative price of capital, hence investment costs, will decrease; thereby raising the growth rate. Thus, these researches and the accent on imports developed the theoretical basis that “international trade is an important

determinant of growth by means of providing access to the needed cost-effective foreign inputs, which in turn, opens access to technology”. For instance, Krueger (1983: 8) expresses that “Any reduction in imports of investment goods could reduce the growth rate while any reduction in imports of raw materials and intermediate goods could affect production and employment levels”. Nonetheless, it is still not clear which way the relationship flows. In simple terms, increase of imports can spur a rise in the growth rate, but also a rise in the growth rate could induce a rise in imports (Humpage 2000: 2). Therefore, it is more probable that there is a bi-directional a relationship between growth and imports.

Literature that tests the effects of imports of investment and intermediate goods on growth and exports is relatively recent. Table 1 below gives a list of such literature by also noting their coverage and basic conclusions. Among this limited literature, that of Esfehani (1991) can be taken as the starting point. Esfehani found out that when imports of intermediate inputs are included in the model originally developed by Feder (1980), the significant and positive effects of exports on growth are lost. One of the striking findings of Esfehani is that in some periods the export coefficient may even get a negative value. Esfehani (1991: 114) interpreted this result as follows: Although exports do not have direct external effects on the GDP of LDCs, export incentives could play a crucial role in closing the balance of payments deficits through providing foreign exchange receipts and in increasing the GDP level.

Table 1 *Literature on the Relationship between Imports and Growth\**

Author(s)	Hypothesis	Methodology and country	Findings
Esfahani (1991)	Relations between imports of intermediate goods, exports and growth	Cross-sectional analyzes on 31 LDCs for periods 1960-73, 1973-81 and 1980-86.	A significant relationship between exports and growth is lost when imports of intermediate goods are added to the model. Statistically significant positive relationship has been found between imports of intermediate inputs and growth.
Lee (1995)	Relations between imports of investment goods and growth	Cross-sectional analyses on 89 LDCs for the period 1960-85	A statistically significant and positive relationship has been found between imports of investment goods and growth.
Zhang and Zou (1995)	Relations between transfer (imports) of foreign technology and growth	Panel data analyses on 53 LDCs for 1965-1988.	Statistically significant and positive relationship between transfer (imports) of technology and growth.
Lawrence and Weinstein (1999)	Relations between total factor productivity in industrial sectors and exports and imports	Time-series analysis on Japan and South Korea for 1963-80.	Significant and positive relationship between productivity and imports. No relationship found for exports in both countries.
Mody ve Yilmaz (2002)	Relations between imports of foreign investment goods and international competitiveness of exports.	Cross-sectional horizontal analyses for 14 DCs and 25 LDCs for 1967-90, both for LDCS implementing export-led strategy and those implementing import-substitution.	Statistically significant and positive relations between imports of investment goods and competitiveness of exports for DCs and those LDCs implementing export-led growth strategy.
Tuncer (2002)	Relations between exports, imports and GDP.	Time series analysis on Turkey for 1980-2000.	Imports affect exports, at the same time there is a strong inter-relationship between imports and GDP.
Chuang (2002)	Relations between technology-heavy imports and growth.	Horizontal cross-sectional analyses on 78 DCs and LDCs, for 1960-85.	A positive relationship between technology-heavy imports and growth.

Li <i>et al.</i> (2003)	Relations between imports of services and growth.	Panel data analyzes on 20 DCs for 1985-1999 and 62 LDCs for 1990-1999.	In DCs positive relationship between imports of services and growth. In contrast, negative relationship between same variables in LDCs.
Alam (2003)	Relations between exports of manufacturing and imports of investment good on growth.	Time series analyses, Brazil for 1955-90; Mexico for 1959-90.	A positive relationship between imports of investment goods and growth; but no effect of exports of manufacturing on growth.
Pawlos (2004)	Relations between imports of investment and intermediate goods on growth.	Time series analyses on Ethiopia for 1960-2000.	A positive relationship of imports of intermediate goods on growth but a negative relationship of imports of investment goods on growth.
Thangavelu and Rajaguru (2004)	Relations between international trade on productivity and growth.	Time-series analyses on LDCs in Asia for 1960-1996.	A positive relationship of international trade both on productivity and growth. It has also been found that imports have a greater impact compared to exports.
Din (2004)	Relations between imports exports and growth.	Multi-variable time-series analysis on India and SriLanka 1960-2002, Nepal 1965-2002, Pakistan and Bangladesh 1973-2002.	A bi- directional long term causality has been found between exports, imports and growth for Bangladesh; for other countries only a short-term such relationship has been found.
Teixeira and Fortuna (2006)	Relations between imports of investment goods and total factor productivity.	Time-series analysis on Portugal for 1960-2001.	A positive relationship found between imports of investment goods and total factor productivity.
Kurt and Terzi (2007)	Relations between exports manufacturing, imports of manufacturing and growth and productivity.	Causality analyses in Turkey on 3-monthly data for 1989-2003.	A bi-directional relationship between imports of manufacturing and growth. A uni-directional relationship of imports of manufacturing on productivity.
Eşiyok (2008)	Relations between production, exports and imports.	Input-output analysis on Turkey for the years (1973, 1979, 1985,	An increasing dependence of production and exports on imports.



		1990, 1996 and 1998.	
Kónya and Singh (2009)	Relations between production in agriculture and manufacturing and import and exports.	Granger causality analysis on India for 1950-2004.	A bi-directional relationship between agricultural production and imports, a uni-directional relationship of imports on manufacturing production.
Çetintaş and Barışık (2009)	Relations between exports, imports and growth.	Panel data, integration and causality analyzes on 13 economics in transition.	Co-integration tests show a long-term relationship between exports, import and growth. In causality test a bi-directional relationship found between exports-imports and imports-growth.
Yıldız and Berber (2009)	Relations between GDP and imports.	Time-series analysis on Turkey for 1989-2007.	A causality relationship of imports of investment and intermediate goods on GDP has been established for a growth strategy based on imports.

**Note:** \* This table has been developed by the authors of this research following a detailed analysis of the relevant literature on the subject.

Based on the literature listed in Table 1 above, we may assert that imports of investment and intermediate goods have a positive effect on growth. The importance of imports of these goods especially for LDCs is obvious. Transfer of technology by means of imports of investment goods raises total factor productivity, hence the growth rate. On the other hand, along with this importance of imports of investment and intermediate goods, increased dependence on imports, the ensuing deficits of foreign trade and current account pose problems for LDCs. Therefore, if these imports are not based on sound finances, the increased deficits could trigger an economic crisis and thus overshadow the positive effects of imports on the growth rate.

### Data and Methodology

The relationship between imports, exports and growth have been investigated in this research for the case of Turkey. There are some important differences

between our study and that of Tuncer (2002: 90-106) which investigates the relations between imports, exports and growth for Turkey for the period 1980-2000 based on 3-monthly data by means of causality test, as well as with that of Berber and Yıldız (2009) which investigates the relation between imports and growth for Turkey for the period 1989-2007 based on co-integration and vector auto-regressive analyzes. We have benefited from the method of analysis used by Feder (1982) and tested the hypothesis of growth led by exports for Turkey for the period 1980-2007 based on yearly data. Furthermore, the Feder model (1982) has been broadened to include the effects of the increase in the level of total imports, the growth rate of imports of investment and of intermediate goods on the growth rate of Turkey. Still further, again differing from the above-mentioned two researches on Turkey which both use 3-monthly data, the causality tests in our research are based on both yearly and monthly data. This aims at investigating the relationship between

exports and imports; and between exports and *per capita* income, and between imports and *per-capita* income by using the Toda-Yamamoto causality tests based on yearly data. But since GDP statistics concerning income on a monthly basis are not available in Turkey we have, instead, used monthly manufacturing production indexes as a proxy for monthly *per-capita* income. And still further, our investigations take into account both monthly as well as yearly data for the causality tests while imports will be sub-categorized into imports of investment and of intermediate goods. Thus, it would become possible to investigate in detail the effects of transfer of technology via imports and import sub-categories on both the level of production (GDP) as well as the performance of exports.

In our research, in the regression analyzes based on yearly data, moving on from the growth Equation developed by Feder (1982) the model has been further broadened by taking advantage of the more current literature on the subject. The broadening of Feder's model is presented below in detail. The 1982 Feder model, which is a Neo-Classical supply-side model, works with the premise that the production of the export sector is a function of labor and capital in this sector; for the non-export sector of the economy it accepts the premise that in order to catch the external economies, the production in this sector is a function of production, labor and capital in the export sector. Feder's model can be summarized with Equation 1 below.

$$\dot{Y}/Y = \alpha(I/Y) + \beta(\dot{L}/L) + [\delta/(1+\delta) + F_x](\dot{X}/X)(X/Y) \quad (1)$$

In this Equation  $\dot{Y}/Y$  is the rate of growth of income,  $I/Y$  the share of investments to income,  $\dot{L}/L$  is the growth of employment of labor,  $X/Y$  is the share of exports in GDP,  $\delta/(1+\delta)$  the effect of differences in productivity and  $F_x$  the effects of external economies. Feder has tested Equation 1 by means of using

horizontal sectoral analyses on 31 LDCs and expressed it with Equation 2.

$$\dot{Y}/Y = \alpha(I/Y) + \beta(\dot{L}/L) + \gamma(\dot{X}/X)(X/Y) + e \quad (2)$$

The parameter  $\gamma$ , in the Equation 2 represents the productivity and externality (external economies) of exports.

### Empirical Findings of Our Research

Our research depends not only on the regression analyzes based on Equation 2 of the Feder model (1982) but also on the Toda-Yamamoto causality tests based both on yearly and monthly data. Therefore, firstly regression and causality tests will be made based on yearly data and followingly causality tests will be made based on monthly data.

### Findings of Our Analyzes Based on Yearly Data

First, we will attempt to estimate the growth Equation as defined in Equation 2 above of the Feder model (1982). In our research, one further variable has been added to Equation 2; this variable is introduced as a shadow variable which represents the economic crises that stem parallel to the growth of imports, structural changes in the Turkish economy (trade and financial liberalization) after the year 1980. This shadow parameter takes on the value of 1 in the crisis years 1994, 1999 and 2001, and zero for all other years. Thus, the regression Equation has been formed as below to include the effects of structural fragilities (crises) as well as the growth of imports ( $\dot{M}/M$ ) on the growth of the Turkish economy.

$$\dot{Y}/Y = \alpha(I/Y) + \beta(\dot{L}/L) + \gamma(\dot{X}/X)(X/Y) + \phi KRIZ + \delta(\dot{M}/M) + e \quad (3)$$

By applying the Equation 3, it would become possible to establish the effects of imports on growth in Turkey for the period 1980-2007.

Lastly, in order to observe and investigate the effects on growth of total imports, imports of investment and of

intermediate goods, Equation 4 has been developed as below:

$$\dot{Y}/Y = \alpha(I/Y) + \beta(\dot{L}/L) + \gamma(\dot{X}/X)(X/Y) + \phi KRIZ + \delta(\dot{RMM}/RMM) + \theta(\dot{IM}/IM) + e \quad (4)$$

In Equation 4, all other parameters represent variables as above while  $(\dot{RMM}/RMM)$  and  $(\dot{IM}/IM)$  represent consecutively the growth rates of imports of intermediate and of investment goods.

In our research, the growth of the economy is represented by the growth rate of *per capita* income, the growth of labor is represented by the population growth rate and investment is represented by changes in the level of gross fixed capital.

The data used are taken from the Turkish Institute of Statistics (TUIK), State Planning Organization (DPT) and Turkish Central Bank (TCMB) as well as data base in the World Development Indicator of the World Bank. They are analyzed by Eview 6.0 package program. Before estimating the Equations (2), (3) and (4) by means of the method of least squares, stability tests have been made on the variables by using the Augmented Dickey-Fuller (ADT) test method. The results of this latter test are summarized in Table 2 below.

Table 2 *The Results of ADF Tests on Yearly Values of the Variables*

Variable	Level	First Differences
$\dot{Y}/Y$	-5.6895(0)*	-6.0964(1)*
$\dot{L}/L$	-4.4789(0)*	-7.5534(0)*
$I/Y$	-1.8642(0)	-4.7639(0)*
$(\dot{X}/X)(X/Y)$	-2.9668(0)***	-5.1624(5)*
$\dot{M}/M$	-6.9149(0)*	-7.0585(1)*
$(\dot{RMM}/RMM)$	-7.2403(0)*	-7.2028(1)*
$(\dot{IM}/IM)$	-6.5268(0)*	-6.1849 (1)*

**Note:** \*, \*\*, \*\*\* represent the statistical significance consecutively of 1%, 5% and 10%. The values in parentheses represent the appropriate time lags. The exports variable does not have unit root in the static model, but none of the other variables have unit roots in both the static model as well as the trend model.

It is found out that the variable the share of gross fixed investments to GDP carries a unit root but none other variables do. With the series that do not have unit root the estimates reached for Equation (2), (3) and

(4) by means of using the method of least Equals are given in Table 3.

Table 3 Feder (1982) Estimation of the Equation

Variable	Equation (2)		Equation (3)		Equation (4)	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-0.5565	-0.3272	1.3541	0.7325	1.5826	0.7773
$\dot{L}/L$	0.8293	1.1280	-0.0282	-0.0404	-0.1406	-0.1670
$I/Y$	1.3663*	9.3379	0.6685*	3.5142	0.6751*	3.3464
$(\dot{X}/X)(X/Y)$	0.0074*	3.4236	0.0026	1.0657	0.0024	0.8922
KRIZ	-----	-----	-3.1936**	-2.3711	-3.2307**	-2.1289
$\dot{M}/M$	-----	-----	0.0808*	4.0469	-----	-----
$(RMM/RMM)$	-----	-----	-----	-----	0.0577***	1.7071
$(\dot{IM}/IM)$	-----	-----	-----	-----	0.0230	0.8589
$R^2$	0.775706		0.8808		0.87265	
$\bar{R}^2$	0.74645		0.8524		0.834444	
D-W Statistic	2.5310		2.1177		2.175721	
F-Statistic	26.514*		31.039*		22.841*	

**Note:** \*, \*\*, \*\*\* represent statistical significance for levels consecutively of 1%, 5% and 10%. The Durbin-Watson statistical value in Equation (2), n: 27 and k: 4 fall on indefinite area for levels over 5% of table values. For Equations (3) and (4), however, the Durbin-Watson statistical value shows that in the 5% level there is no consecutive (successive) dependence. The t-value is based on White's (1980) *hetero-skedasticity* robust covariance estimators (Greene 2000, p.506).

The findings of estimating the Equation (2) show that the share of gross fixed capital to GNP and exports has contributed to the growth of the Turkish economy in a statistically significant way. This may also be interpreted as export-led growth strategy implemented in Turkey since 1980 had positive effects.

But, with the inclusion to the Feder (1982) model of increases in imports and the economic crisis variable, the tests show that all variables taken into consideration in the Equation have positive effects on growth – except exports and population growth. This conclusion can be interpreted as export-led development in Turkey had positive effects via raising imports. In other words, with the inclusion of the import variable into Equation 2, the significance of the effects of exports via productivity and external economies disappear. This conforms with the findings of Esfahani (1991: 93-116). When we take into consideration that in the later years of

the period studied the major part of imports in Turkey were intermediate and investment goods (90%) it becomes clear that Turkey has to import in order to grow and to export, that is, imports acquire importance.

The results of the estimates of Equation (4), on the other hand, show that imports of intermediate goods have a greater impact on the growth of the Turkish economy compared to imports of investment goods. This finding suggests that the growth of the Turkish economy depends on the use of cheap imported intermediate goods and domestic production based on these imported intermediate goods.

In this research, in addition to regression analyzes based on growth Equations, dual causality tests have been made between imports (M), exports (X) and *per capita* income (PCY) as developed by Toda and Yamamoto (1995). In addition, relations between imports of intermediate materials (RMM) and imports

of investment goods (IM) with exports and with *per capita* income are also investigated.

Toda-Yamamoto causality method opens the possibility testing the VAR model on the level values even in case parameters are not static. The k coefficient obtained by using the VAR model has been subjected to Wald test to investigate whether there is causality between the variables. In the model, k shows the lag coefficient;  $d_{max}$  shows the maximum

integration level of variables. Therefore, before going into VAR model estimates, we had to investigate and ascertain the integration levels of variables in the models (Tuncer 2002: 95-96; Yavuz; 2006: 169). The maximum integration degrees of the variables have been calculated by using the Dickey-Fuller unit root test. The conclusions obtained from our stability tests both in the case of static and trend structures are presented in Table 4 below.

Table 4 Unit Root Test Results

Variables	Level	First Differences
LPCY	-2.1946 (0)	-5.7057 (0)*
LX	-2.3870 (0)	-4.8198 (0)*
LM	-1.3565 (0)	-4.3259 (0)*
LRMM	-1.0134 (0)	-3.5499 (0)***
LIM	-2.8863 (0)	-5.7659 (0)*

**Note:** L means that the logarithm of the variables is taken. \*, \*\* and \*\*\* show statistical significance consecutively for 1%, 5% and 10% both for the case of static and trend structure. The values in parentheses, on the other hand, give the lags of the variables.

According to ADF test conclusions in Table 4 above, it has been found that none of the variables have unit root at the first differences. Therefore, it was established that the variables become integrated at the *first difference* and hence have been included in the VAR system with maximum integration degree ( $d_{max}$ ) 1. The lag value (k) which is required for the VAR system of the Toda-Yamamoto test has been established as 3 according to the Akaike Information Criterion (AIC). In the

light of the above information, the causality test VAR System has been defined as (VAR ( $k+d_{max} = 4$ )), as in Equation 5 and has been investigated by using the Seemingly Unrelated Regression (SUR) method.

$$\begin{bmatrix} LPCY \\ LX \\ LM \end{bmatrix} = \beta_0 + \beta_1 \begin{bmatrix} LPCY_{t-1} \\ LX_{t-1} \\ LM_{t-1} \end{bmatrix} + \beta_2 \begin{bmatrix} LPCY_{t-2} \\ LX_{t-2} \\ LM_{t-2} \end{bmatrix} + \beta_3 \begin{bmatrix} LPCY_{t-3} \\ LX_{t-3} \\ LM_{t-3} \end{bmatrix} + \beta_4 \begin{bmatrix} LPCY_{t-4} \\ LX_{t-4} \\ LM_{t-4} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix} \quad (5)$$

The results of the Wald test which takes into account the coefficients of the variables as determined by Equation (5) have been presented in Table 5 below.

Table 5 Toda-Yamamoto Causality Test Results

VAR(4) k=3, $d_{max}=1$		
Null Hypothesis ( $H_0$ )	$X^2$ Statistic	P-Value
LM doesn't cause LX	8.168	0.0427**
LX doesn't cause LM	12.931	0.0048*
LPCY doesn't cause LX	26.729	0.0000*
LX doesn't cause LPCY	20.018	0.0002*
LPCY doesn't cause LM	9.116	0.0278**
LM doesn't cause LPCY	9.272	0.0259**

**Note:** \*, \*\* show that zero hypothesis has been rejected consecutively for values 1% and 5%.

According to the findings in Table 5, there is a statistically significant bi-directional relationship of causality between all the variables. Therefore, based on the bi-directional causality relationships, this research established an important fact that in the Turkish economy developments in imports have causal effects both on exports and on *per capita* income.

In plain language, imports emerge as an important determinant of both the level of income and also the performance of exports in the Turkish economy. We can, however, also underline that the capability of importing depends on exports of goods and services which are the most important

items of foreign exchange earning activities as well as the level of income and purchasing power that is reflected in the research as *per capita* income.

The VAR test to investigate the causality between sub-categories of imports and exports and *per capita* income carried with 3 lag and 1 maximum integration degree, on the other hand, has been established as in Equation 6.

$$\begin{bmatrix} LPCY \\ LX \\ LRMM \\ LIM \end{bmatrix} = \beta_0 + \beta_1 \begin{bmatrix} LPCY_{t-1} \\ LX_{t-1} \\ LRMM_{t-1} \\ LIM_{t-1} \end{bmatrix} + \beta_2 \begin{bmatrix} LPCY_{t-2} \\ LX_{t-2} \\ LRMM_{t-2} \\ LIM_{t-2} \end{bmatrix} + \beta_3 \begin{bmatrix} LPCY_{t-3} \\ LX_{t-3} \\ LRMM_{t-3} \\ LIM_{t-3} \end{bmatrix} + \beta_4 \begin{bmatrix} LPCY_{t-4} \\ LX_{t-4} \\ LRMM_{t-4} \\ LIM_{t-4} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \end{bmatrix} \quad (6)$$

Table 6 gives the results of the WALD tests calculated by using the coefficients determined by means of SUR.

Table 6 *Toda Yamamoto Causality Test Results*

VAR(4) k=3, d <sub>max</sub> =1		
Null Hypothesis (H <sub>0</sub> )	X <sup>2</sup> Statistic	P-Value
LRMM doesn't cause LX	6,896	0.0753***
LX doesn't cause LRMM	22,813	0.0000*
LIM doesn't cause LX	9,262	0.0260**
LX doesn't cause LIM	8,535	0.0362**
LPCY doesn't cause LX	24,936	0.0000*
LX doesn't cause LPCY	23,065	0.0000*
LIM doesn't cause LRMM	5,633	0.1309
LRMM doesn't cause LIM	3,007	0.3905
LPCY doesn't cause LRMM	4,703	0.1949
LRMM doesn't cause LPCY	11,899	0.0077*
LPCY doesn't cause LIM	5,319	0.1499
LIM doesn't cause LPCY	12,496	0.0059*

Note: \* and \*\* show zero hypothesis is rejected consecutively for 1% and 5% levels.

The causality between variables, its direction and statistical significance give in Table 6 has been shown with the aid of Figure 4 below.

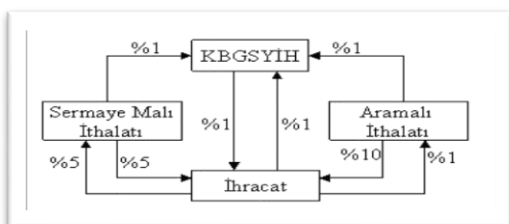


Figure 4 *The Direction of Causality Between Variables*

The bi-directional causality between exports and *per capita* income, as can be followed from Figure 4 reflects an economic structure in which growth is dependent on exports and exports dependent on growth. With the 24 January 1980 economic policies, Turkey has started to change her foreign trade and industrialization strategy and has become more integrated to world markets. Therefore, the findings of this research which investigates the post 1980 period of the Turkish economy, has found significant

support of the effects of this export-led growth strategy. This integration with the world economy had not only manifested itself in the area of exports but also had important effects on the imports side. In this context, applying the Toda-Yamamoto causality test, we have established both a uni-directional causality of imports of intermediate and investments on *per capita* income, but also the presence of a bi-directional causality between imports of intermediate and investment goods and exports and a structure in which growth as well as exports are dependent on imports. This means that the income level of the Turkish economy and the performance of exports depends on the imports of required inputs and thereby transfer of technology. But, this increase in imports and transfer of technology is, in turn, dependent on exports of goods and services, and foreign exchange earned thereby.

### The Results of the Analyzes Based on Monthly Data

As the next step in our research, we have also investigated the relationships between total and sub-categories of imports with exports and industrial production indexes by means of applying the Toda-Yamamoto test and by using monthly data, for the period 1990-2008. Firstly, in the monthly data on Industry Production Index (IPI), exports (X), imports (M), imports of intermediate goods (RMM) and imports of investment goods (IM), the effects of seasonality were removed by means of applying the method of weighted averages. Before making the causality test, the maximum integration degree ( $d_{max}$ ) required for the VAR system was investigated by the ADF test. The results of the test of stability of the variables are presented in Table 7 below.

Table 7 The Results of ADF Unit Root Tests

Variables	Level	First Differences
LPI	-2.5675 (12)	-3.1172 (11)***
LX	-1.6984 (12)	-4.0143 (11)*
LM	-2.3727 (1)	-23.4001 (0)*
LRMM	-2.4962 (1)	-22.4234 (0)*
LIM	-3.0412 (1)	-25.7336 (0)*

**Note:** L means that the logarithms of the variables are taken. \*, \*\* and \*\*\* show the statistical significance of maximum integration degree in the case of both static and trend models, consecutively for 1%, 5% and 10%. The values in parentheses show the length of lags.

According to the results of the ADF tests given in Table 7, the maximum integration degree of the variables have been determined as ( $d_{max}$ ) 1; the length of the lag (k) in the VAR model has been set as 13. Using these values, the VAR System has been constructed as in Equation 7 below to investigate the causality relations between exports, imports and industrial production index.

$$\begin{bmatrix} LPI \\ LX \\ LM \end{bmatrix} = \beta_0 + \beta_1 \begin{bmatrix} LPI_{t-1} \\ LX_{t-1} \\ LM_{t-1} \end{bmatrix} + \beta_2 \begin{bmatrix} LPI_{t-2} \\ LX_{t-2} \\ LM_{t-2} \end{bmatrix} + \dots + \beta_{14} \begin{bmatrix} LPI_{t-14} \\ LX_{t-14} \\ LM_{t-14} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix} \quad (7)$$

The results of the Wald test applied on the coefficients of the VAR solution of Equation 7 are presented in Table 8 below.

Table 8 *The Results of the Toda-Yamamoto Causality Tests*

VAR(14) k=13, d <sub>max</sub> =1		
Null Hypothesis (H <sub>0</sub> )	X <sup>2</sup> Statistic	P-Value
LM doesn't cause LX	30.361	0.0042*
LX doesn't cause LM	20.438	0.0848***
LIPI doesn't cause LX	25.245	0.0214**
LX doesn't cause LIPI	25.882	0.0176**
LIPI doesn't cause LM	27.360	0.0111**
LM doesn't cause LIPI	49.548	0.0000*

**Note:** \* and \*\* show that zero hypothesis has been rejected consecutively for 1% and 5%.

The findings in Table 8 are exactly similar to the Toda-Yamamoto test using yearly data above: There is a bi-directional causality relationship between industrial production and exports plus imports. These findings denote that industrial production and the performance of exports depends on the capability to import and, in turn, the capability to import depends on industrial production and exports.

When, on the other hand, the sub-categories of imports, namely imports of

intermediate goods and of investment goods are taken into account, according to AIC, the appropriate lag length is determined as 13 and the VAR system has been formed in Equation 8 as below:

$$\begin{bmatrix} LIPI \\ LX \\ LRMM \\ LIM \end{bmatrix} = \beta_0 + \beta_1 \begin{bmatrix} LIPI_{t-1} \\ LX_{t-1} \\ LRMM_{t-1} \\ LIM_{t-1} \end{bmatrix} + \beta_2 \begin{bmatrix} LIPI_{t-2} \\ LX_{t-2} \\ LRMM_{t-2} \\ LIM_{t-2} \end{bmatrix} + \dots + \beta_{14} \begin{bmatrix} LIPI_{t-14} \\ LX_{t-14} \\ LRMM_{t-14} \\ LIM_{t-14} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \end{bmatrix} \quad (8)$$

The results of the Wald test depending on the solution of the VAR system given in Equation 8 are presented in Table 9 below.

Table 9 *The Results of the Toda-Yamamoto Causality Tests*

VAR(14) k=13, d <sub>max</sub> =1		
Null Hypothesis (H <sub>0</sub> )	X <sup>2</sup> Statistic	P-Value
LRMM doesn't cause LX	21.723	0.0598***
LX doesn't cause LRMM	35.840	0.0006*
LIM doesn't cause LX	28.890	0.0068*
LX doesn't cause LIM	16.470	0.2247
LIPI doesn't cause LX	19.085	0.1205
LX doesn't cause LIPI	30.626	0.0038*
LIM doesn't cause LRMM	12.378	0.4969
LRMM doesn't cause LIM	36.144	0.0006*
LIPI doesn't cause LRMM	25.593	0.0291**
LRMM doesn't cause LIPI	24.861	0.0241**
LIPI doesn't cause LIM	20.547	0.0824***
LIM doesn't cause LIPI	27.066	0.0122**

**Note:** \* and \*\* show that zero hypothesis has been rejected consecutively for 1% and 2%.



The causality relations are pictured in Figure 5. The first finding that is obtained from the application of the Toda-Yamamoto test on monthly data for the period 1990–2008 of the Turkish economy is that there is a uni-directional causality from exports to industrial production.

But, as one important finding of this research, there is a bi-directional causality relation of imports of intermediate goods both with exports and with industrial production. In addition, we have also established a bi-directional causality between imports of investment goods and industrial production, and a uni-directional causality of imports of investment goods on exports. All the above findings mean that exports are dependent on imports, and industrial production dependent again on imports for the case of the Turkish economy, for the period studied.

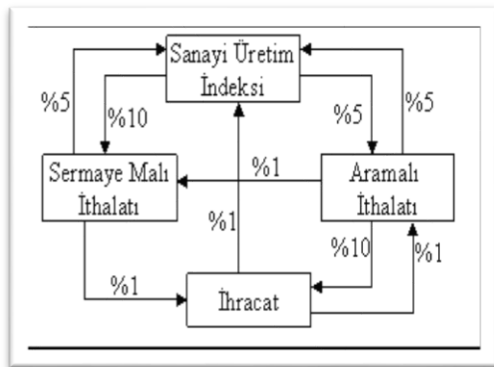


Figure 5 The Direction of Causality Between Variables

The presence of a bi-directional causality between exports and imports of intermediate materials but a uni-directional causality from imports of investment goods to exports signifies the importance of imported intermediate goods as well as that of technology transfer for raising the export level. These findings thereby underline that imports of investment goods, that is, transfer of technology gives rise to factor productivity increases, hence stimulates export rises. Increases in exports, on the other hand, induce imports

of intermediate goods rather than investment goods. In simple terms, the rise in exports in Turkey is affected by imports of both intermediate and of investment goods. But rises in exports induce a rise in the imports of intermediate goods only. This, in turn, means that growth in Turkey depends largely on domestic production that uses imported intermediate goods. These imported inputs are subjected to a low value-added domestic production and offered both to the domestic market as well as exports to world markets.

In sum, although a uni-directional relationship from exports to industrial production suggests the implementation of export-led growth strategy, the bi-directional relations between imports of intermediate and of investment goods and industrial production signify the presence of growth dependent on imports, and imports depending on growth. The presence of a relationship stemming from imports of intermediate and investment goods to exports, on the other hand, signifies an export-structure dependent on imports. All these findings are consistent with the data that Turkey's exports contain 70% imported inputs (Güngör, 2007). Therefore, we may deduce that, although an export-led growth strategy was implemented since 1980, underneath we experienced processes of growth dependent on imports and exports dependent on imports. This process evolved particularly during the more recent years with the implementation of high-interest rates and under-valued foreign-exchange (over-valued currency) practices.

To cite, when we look into the real foreign exchange rate index, taking as base the year 1995, for the period 1980-2006 Consumer Price Index (CDI) had risen to 170.2% and Production Prices Index (PPI) had risen to 141.1% in 2009. These indexes mean that the value of Turkish currency rose by 70.2% according to (CPI) and by 44.1% according to PPI. During the period 1980-2006, excepting the years

1986, 1987, 1988, 1994, 1995 and 1996, in all other years the Turkish lira was always over-valued (TCMB). One major reason for this was entry of foreign exchange. The deficit of the current account in Turkey was in most cases met with entry of direct private investments and financial funds, and the major cause of this increase, particularly of financial funds was the result of a policy of high interest rates (Baig, *et. al*, 2006, Öztürk 2010).

### Summary, an Evaluation and Conclusions

In the case of Turkey, the 24 January 1980 economic policy decisions discarded the inward-orientation and import-substitution growth strategy and accepted outward-orientation and liberalization of trade. Hence, exporting sectors began to acquire increasing importance. This change of growth strategy gave rise to important structural changes. Turkish economy was in a stage of primary, labor-intensive commodity exports mainly comprised of agricultural goods up until 1980. After the 1980 change of economic strategy, Turkey began to encourage labor-intensive manufacturing sectors such as textiles and became predominantly an exporter of manufacturing goods vs. agricultural. In the more recent years, the automotive industry replaced textiles as the number one exporting sector. But the automotive sector was relatively capital-intensive, hence it induced increases in imports of both intermediate and investment goods. As a result, the share of imports in the value of exports rose up to 70% and total exports became greatly dependent on imports of both intermediate and investment goods.

In this research, the effects of these structural changes in the Turkish economy on economic growth and foreign trade are investigated by using basically the Feder (1982) model; but the model had to be

broadened. By applying this model to the yearly data of the period 1980-2007, the growth equation estimations showed that exports were an important determinant of growth. But with the inclusion of the variable imports to the model, the statistical significance was lost. This finding suggests that the positive impact of exports on growth appears through imports. Therefore, the variable imports were added to the model divided into two sub-categories: intermediate goods and investment goods. By applying this enlarged model it was found that the positive effects of imports on growth manifested itself particularly for the case of intermediate goods as compared to investment goods. The Toda-Yamamoto causality tests also confirmed the finding above.

In addition to using yearly data, causality tests were applied in this research on monthly data for the period 1990-2008. The most important finding obtained from these latter tests was *the presence of bi-directional causality between industrial production index (proxy for income), exports and total imports*. In addition, when we take into consideration the sub-categories of imports, we find out a bi-directional causality between exports and imports of intermediate imports. But a one-direction causality was found from imports of investment goods to exports. Causality analyses using the yearly data and monthly data denote that *Turkey goes through a process of growth dependent on imports and also exports dependent on imports*.

On the other hand, this dependence of the Turkish economy firstly on imports of intermediate goods and also on imports of investment goods brings to the fore the *question of financing the imports which is required for growth and exports*. In the more recent years, the Turkish Central Bank (TCMB), in order to finance current deficits, implemented a policy of high interest-rates which attracted the short term financial flows. But thereby it gave rise to

over-valued domestic currency. This policy does not encourage competitive restructuring of exports. Instead, it indirectly induces *exports using low-priced imported inputs*. Both the increased flow of direct private investments and of financial funds help the financing of the ever-increasing current account deficits. But it does not encourage and expand foreign exchange income obtained from high-value-added sectors of industry and services. Therefore, the possibility of continuing for ever with this strategy for growth is open to question. In plain terms, this strategy may have caused a relatively high growth rate thus far, but it has certainly increased the fragility of the Turkish economy for the future.

Our above fears were confirmed with the outbreak of the global financial crisis and global recession in September 2008. The Turkish economy experienced a precipitous decline in growth following a decline of entry of foreign exchange in the form of direct private investments and financial funds. Exports, particularly those directed to Europe also declined. Turkish economy swam through the crisis by restricting imports as well as budget expenditures while the Turkish Central Bank started to reduce the interest-rate gradually. By also giving priority to exporting to non-European countries, the Turkish economy started to recover soon. But it is too early to make a statistical testing of these continuing changes at this point.

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