



LUND UNIVERSITY
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Innovation and Spatial Dynamics

An analysis of the relationship between foreign trade and economic growth in Turkey over the period 1980-2009

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Abstract: This study analyzes the relationship between foreign trade and economic growth in Turkey during the last three decades while particularly observing distinctive feature of the last decade in terms of economic growth-foreign trade relationship. The study adopts two main methodological approaches. The first approach includes two econometric analyses based on VAR and VEC models regarding periods 1987:1-2007:3 and 2000:1-2007:3 for investigating the dynamic relationship between GDP, exports and imports. The second approach includes the analysis of composition change in foreign trade of Turkey in the period 1980-2009 based on descriptive statistics. The results of analyses suggest that imports was one of the significant determinants of the economic growth in Turkey during the periods 1987:1-2007:3 and 2000:1-2007:3 whereas exports did not have important impacts on it. It is found that the export growth was significantly affected by the GDP growth, which indicates growth-led export pattern in Turkey during these periods. Also there is found no significant relationship between exports and imports. Even though the distinctive characteristic of foreign trade pattern of the last decade is observed, the results do not support that the last decade distinct from the previous decades in terms of foreign trade and economic growth relationship.

Keywords: Turkey, economic growth, foreign trade, export-import composition

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1. Introduction

1.1 Research Problem

The relationship between foreign trade and economic growth has been studied by many scholars in economics literature. It seems that this relationship has been mainly analyzed from the standpoint of the issue of trade openness vs. protectionist trade policies. It is widely accepted and may become somewhat 'stylized fact' in growth literature that international trade and economic growth are positively and significantly related, even though there are some counter-arguments which say that it is difficult to differentiate between the effects of foreign trade and those other economic policies on growth (Lewer and Van den Berg 2003). Actually, this issue has gained importance in Turkey since the 1980s where the country started to open its economy to the world with implementing liberal economic policies. Turkey has increasingly become integrated into the global economy and foreign trade has become one of the essential elements of economic growth in the country during the last three decades.

Even though the country has experienced an economic transformation with liberal economic policies since the 1980s, the most prominent progress began to appear after the turn of the new millennium which refers to the beginning of a different period in Turkey. During the last decade, Turkey has witnessed three significant events, which have had impacts on Turkish economy. Two of which are Turkish twin financial crises that occurred in December 2000 - February 2001, which led to a huge turmoil in the economy that in turn end up with 5,7% contraction. In 2002, with the establishment of new government, while the rehabilitation and reformation in the financial sector were pursued, Turkey also started to give importance to its international relations which has boosted the foreign trade. In short, these three important events made the period somewhat different relative to previous decades.

In essence, Turkey experienced a prominent economic growth in between the years 2002-2008 which determined by the Turkish financial crisis and global economic crisis. Turkey grew almost 7% in average during this period of time.¹ If one looks at foreign trade indicators of Turkey in the last decade, he or she can see that the country's foreign trade volume increased more than threefold within this period of time and reached the value of \$243 billion in 2010. Also the ratio of export to GNP increased from 10,5 percent to 16,6 percent while the ratio of import to GNP rose to 22,9 per cent from 20,5 per cent.² Therefore, it can be said that foreign trade increasingly became an

1 Republic of Turkey Ministry of Foreign Affairs, "Economic Outlook of Turkey," <http://www.mfa.gov.tr/prospects-and-recent-developments-in-the-turkish-economy.en.mfa> (accessed April 5, 2011).

2 Turkish Government, Undersecretariat of the Prime Ministry for Foreign Trade, "Dış Ticaret (Yıllık-Dönemsel)," <http://www.dtm.gov.tr/dtmweb/index.cfm?action=detayrk&yayinID=1116&icerikID=1225&dil=TR> (accessed April 5, 2011).

important part of Turkish economy in the last decade. There were certainly several factors that contributed to the economic growth of Turkey. However, in this thesis, the foreign trade of Turkey is taken as a research issue. Accordingly it is sought to be analyzed that how increasing foreign trade affected and contributed to the economic growth in Turkey by comparing the last decade with the prior two decades.

The thesis does not analyze the relationship between foreign trade and economic growth just from one perspective. Rather, it seeks to analyze the relationship between economic growth and the factors of trade, and to analyze foreign trade pattern by observing trends in export and import composition and attempts to evaluate their impacts on economic growth. Actually, most of the related studies in this area focus on the causal relationship between foreign trade and economic growth in the long-run and many of them rely on certain econometric methods. In this thesis, besides using some econometric methods for doing analysis of causality among economic growth and foreign trade factors, we do analysis of composition change in exports and imports based on descriptive statistics, which was not adopted in the previous case studies of Turkey from the perspective of the relationship between foreign trade and economic growth. Also we conduct these analyses in a comparative manner in order to observe any distinctive feature of the last decade relative to the previous two decades in terms of foreign trade performance and its likely effects on the economic growth. In short, the thesis seeks to analyze how and to what extent foreign trade of Turkey contributed to its economic growth in the last three decades, by making comparison between the last decade and previous two decades.

1.2 Aim and scope

One of the aims of the thesis is to contribute to the literature through understanding the foreign trade pattern of Turkey from different perspectives and examining its potential impacts on the economic growth during the last three decades. By pursuing on this aim, the deeper understanding would be gained in these issues: was foreign trade an important determinant of Turkey's economic growth in the last three decades, how did foreign trade factors affect the economic growth, how changing export-import structure of Turkey influenced the economic growth. In fact, all these points are sought to be found out through comparing the last decade with the previous two decades in order to see whether the last decade distinct from the previous periods in terms of foreign trade and economic growth relationship.

Furthermore, the objective of the thesis is not just to study the causality between foreign trade and economic growth, but also analyzing the fundamentals of foreign trade pattern of the country and how and to what extent it had an impact on the economic growth through examining the change in

export and import composition. Particularly, we analyze the export-import structure of Turkey based on three steps with using descriptive statistics. Firstly, we look at the traded volumes of capital goods, intermediate goods and consumption goods. Secondly, we observe the change in sector shares of agriculture, mining and quarrying, and manufacturing in the export-import composition. Thirdly, we analyze the export-import structure of manufacturing sector by looking at the changing shares of low value-added and high value-added product groups. In short, we seek to capture changes in export-import structure and to see how it can give implications for the relationship between foreign trade and economic growth.

The paper studies the period 1980-2009, though the focus is placed on the last decade which refers to the period of 2000-2009. We look at the previous two decades basically for two reasons. First, Turkey started to open its economy to the global economy with giving importance to its foreign trade after the beginning of the 1980s. Second, we want to compare and contrast the last decade with the previous two decades in order to see whether it is different from the previous periods. Even though the scope of time period is set as 1980-2009, due to lack of data in constant prices before 1987, econometric analyses are done based on the period 1987-2007. The other analysis with descriptive statistics takes into account the period 1980-2009.

1.3 Outline of thesis

The study is organized as follows. In second chapter, we provide sufficient information on historical background of Turkish foreign trade and growth strategy of the country by observing the period after 1980. We also overview the foreign trade of Turkey by looking at imports, exports and ratio of dependence on foreign trade in order to see the trends in foreign trade pattern of the country during the last three decades. In third chapter, general literature review is done and the most relevant studies are mentioned. Then, theoretical framework is set in order to examine and discuss the relationship between foreign trade and economic growth. Afterwards, we define some hypotheses for the thesis based on the discussion in the sections of historical background and theoretical framework.

The fourth and fifth chapters concern with data and methods respectively. We provide details of our source material and define data sets for different analyses of the thesis. The fifth chapter consists of two sections which are defining econometric model and descriptive statistics. Besides mentioning the relevance and limitations of selected methods regarding the research question, we present details of application processes of each method. In sixth chapter, empirical analysis is done in three main sections. The first section shows the econometric analysis and its results. The second section shows the analysis of composition change in foreign trade. The third section makes the discussion of these

two main analyses within the general context of the thesis. In seventh chapter, we make conclusion with an extensive summary of the thesis.

2. Background

2.1 Brief historical background

Turkey adopted protectionist economic policies after the establishment of new republic in 1923. From the beginning of the new republic era, the role of state on Turkish economy was very important especially when one considers the devastating effects of World War I and Independence War experienced by the country before the 1920s. Also, protectionism was the main trend in government policies during the first half of the 20th century. Therefore, the protectionist economic policies of Turkey were mainly shaped by both internal economic conditions and similar policy trend in rest of the world. By carrying out import-substitution strategies, the state aimed to develop and also to protect the country's infant industries, which was presumed to be an important factor to stimulate the economic growth of Turkey. Hence, the state was the primary actor in key industries such as textiles, manufactured products, telecommunication and energy. Also State Economic Enterprises established by the government to increase manufactured products which were previously imported. However, these policies unsurprisingly did not create incentives for exportation and also for employment till the end of the 1970s (Temiz and Gökmen 2010).

Turkey experienced a major change in its economic structure and policies especially from the beginning of the 1980s. Import-substitution industrialization strategies of the 1960s and 1970s were replaced by export-oriented industrialization strategy in the 1980s. Instead of just focusing on production for domestic markets and limiting international trade in the country, by adopting this new strategy, Turkey aimed to promote its exports, to liberalize its foreign trade regime and to encourage its private sectors activities. Therefore, the integration of Turkish economy into the world markets has been the main stimulus behind the governments' economic policies since the beginning of the 1980s (Aysan and Hacıhasanoğlu 2007). As a result of liberal economic policies, Turkey was able to improve allocation of resources, to facilitate the spread of knowledge spillovers and access to technologies, to acquire new intermediary goods, to increase employment rate whereas it provided higher income and intensified the level of industrialization and the application of economies of scale and scope (Temiz and Gökmen 2010).

Domestic and international crises experienced by Turkey

On the other side, it could be argued that growth performance of Turkey after the 1980s was increasingly hampered by boom-and-bust cycles characterized by periods of industry-led rapid

expansion, followed by balance of payments crises, devaluations of the Turkish lira and austerity programs to decrease domestic demand for foreign goods, and resurgence of foreign indebtedness with another cycle. Macroeconomic instability related with high inflation and weak currency and volatile real GDP growth were the most serious issues faced by Turkey during the following two decades after 1980. Due to lack of sufficient and sound macroeconomic policies and regulatory and institutional reforms, the Turkish economy was significantly and severely affected by repeated economic crises in the 1990s. Actually the four crises which were in 1991, 1994, 1998 and 1999 reflected several major weaknesses in the Turkish economy (Macovei 2009, 8).

Particularly, huge requirements for public sector borrowing in 1993 and in early 1994, besides major policy errors in financing the deficit, led to currency crisis in 1994, which resulted in a 6 percent decline of output and loss of half of the Central Bank's reserves and the exchange rate depreciation by more than half. In the post-1994 crisis period, factors such as taking some measures to bring down inflation in the country, the contraction of world demand which triggered by the capital outflow in many developing countries after the 1997 Southeast Asian Crisis, and excess capacity which was established in the real sector due to heavy investments after the Customs Union agreement with EU, eventually led to severe contraction in the Turkish economy in 1998/99. These factors were also combined with the Russian crisis and two devastating earthquakes in Turkey in 1999 (Yücel 2009).

Even though the government sought to take steps for stabilizing economy by reducing the budget deficit and inflation rate, structural weaknesses such as inadequate regulatory and supervisory framework for the banking system, the tendency of banking sector to become the main instrument of government financing which funneling short-term borrowing from depositors and investors into government created downward pressures on the economy's stability. When all these factors combined with poor economic policies such as tax amnesties and repeated reductions in the retirement age, the boom-bust cycle culminated in the 2000/01 financial crisis which was the severest to date. As a result, the real GDP declined by 5,7%, exports of goods and services declined by around 1% whereas imports diminished by almost 8% due to depressed domestic demand and sharp depreciation of the domestic currency (Macovei 2009, 8).

Recovery after 2001 crisis

However, the Turkish economy entered a recovery process rapidly after the 2001 crisis with clear medium-term roadmap, strong external anchors like IMF programs, the prospect of EU accession and bold domestic reforms in the forms of tight fiscal and monetary policies which promoted macroeconomic stability in the country. Actually, the emergence of single-party majority

government from the November 2002 elections helped to take away political uncertainties and boded well for the future stability of the economy. Structural reforms in the area of enterprise restructuring and privatization, business environment, trade liberalization, labor market and proper reform of banking sector supported the macroeconomic stabilization process of the country. As a result of these steps, foreign and domestic investments boomed, labor productivity and sectoral transformation increased, which in turn facilitated the real convergence process of Turkey.

In particular, during the period of 2002-2007, Turkey experienced an outstanding growth in real GDP. It grew on average by 6,8% annually which was more than double the average posted during the boom-bust decade of the 1990s. GDP per capita level increased almost 10 per cent while the Turkish economy became the 17th largest economy in the world over this period. By taking all these facts into account, it could be argued that the catching-up process of the Turkish economy accelerated markedly during 2002-2007. It seems to be accepted in general that growth was driven mainly by increasing private consumption and in particular by a boom in investment which grew on average by 15% in real terms during this period (Macovei 2009, 13-14). However, in this paper, the importance and certain impacts of foreign trade on growth process is taken into consideration. The following section provides some facts regarding the country's foreign trade and GDP performance during the last thirty years.

2.2 General overview of Turkish foreign trade and GDP

In order to understand the economic situation of Turkey during the last three decades, it would be good to look at general outlook of the country's foreign trade and GDP.

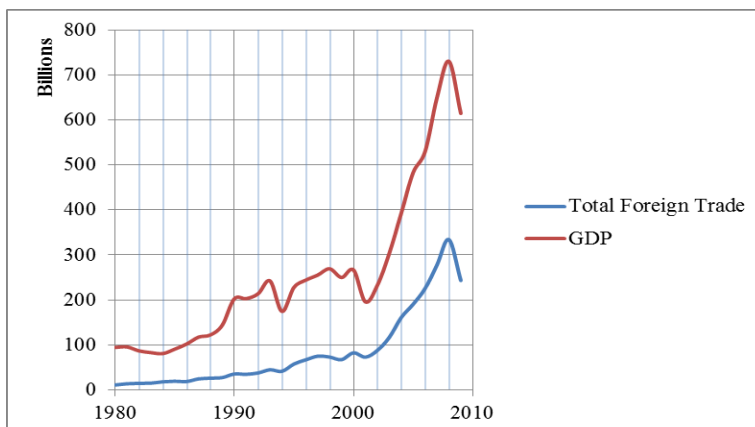


Figure 1. Total Foreign Trade and GDP during the period 1980-2009. Billion Dollars.

Source: Turkstat

Figure 1 provides some implications for the relationship between foreign trade and GDP, and for comparison of three decades in terms of foreign trade and GDP performances. In general, it is seen that there is a somewhat similar growth trend in both GDP and foreign trade. In fact, from the

beginning of the 1980s to the end of the 1990s there was a modest growth both in GDP and total foreign trade volume. However, after the year of 2001, it is apparently seen that GDP and total foreign trade show a rapid growth trend which cannot be seen in the previous two decades. In that sense, contribution of foreign trade to GDP and the relationship between the two are more clearly seen in the last decade and might imply that this period is different from the previous ones.

It would also be worth to mention here that three major economic crises experienced by Turkey within thirty years of period created an important downward pressure on the GDP and foreign trade volumes. It can be apparently observed from Figure 1 that in the crisis years of 1994, 2000/01, and 2008/09, Turkey experienced certain shrinkage in both GDP and foreign trade values. If one looks at the preceding and subsequent years of economic crises he or she would see that changing trend in both GDP and foreign trade values are very similar. Therefore, decreases and increases in trends of these two indicators with regards to crisis years may infer that there is a strong relationship between foreign trade and GDP in Turkey during the last three decades.

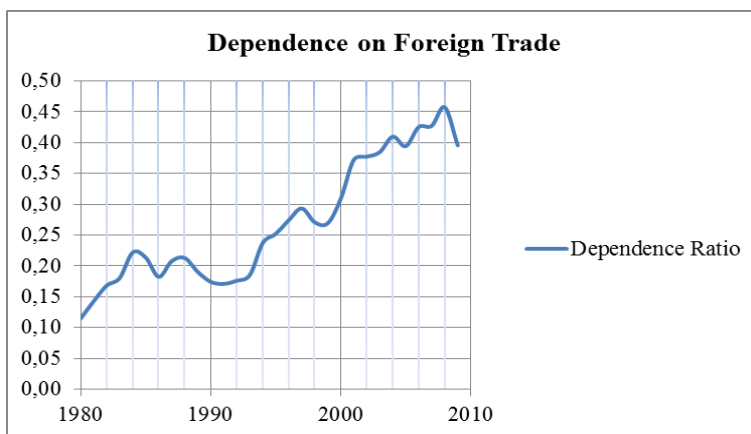


Figure 2. Foreign Trade dependence of Turkey during the period 1980-2009. *Source: Turkstat*

The foreign trade dependency ratio can also be an appropriate index to analyze the relation between foreign trade and GDP. The curve in Figure 2 shows the foreign trade dependency ratio in Turkey during the last thirty years. The ratio explains the dependency of Turkish economy on foreign trade which includes the total volume of imports and exports, and shows the trade openness of the country. As it can be seen from the figure, the dependence ratio increased from around the level of 10% to the 45% level though the trend did not show uniform pattern. However, in general, by looking at the increasing trend of foreign trade dependency ratio of Turkey, it can be argued that foreign trade became more and more important in the Turkish economy as the country increasingly engaged into the world economy during the last three decades.

The increasing ratio may also indicate the contribution of foreign trade to the economic growth; however it does not provide details of it. In other words, the dependence ratio can give some insight

on general outlook of foreign trade trend in the country but it does not cover the details of how composition of the GDP and foreign trade changed over time. Generally, the foreign trade dependency ratio is a widely used index and so it is mentioned and taken as an indicator in the paper in order to show the increasing importance of foreign trade in the Turkish economy.

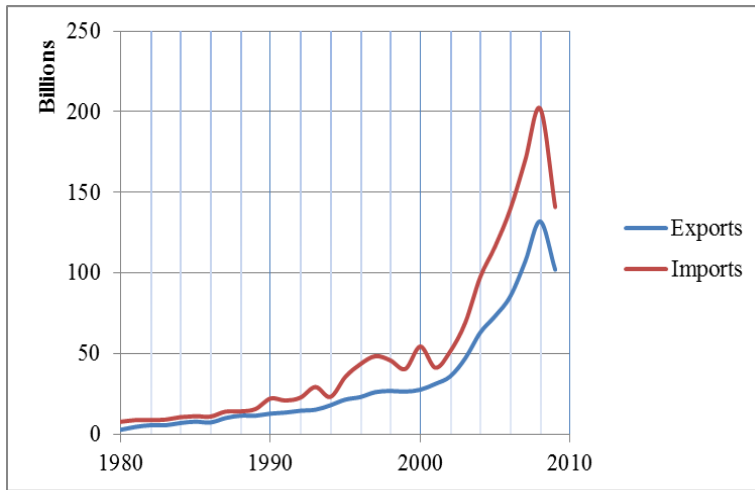


Figure 3. Exports and Imports of Turkey during the period 1980-2009. Billion Dollars.

Source: Turkstat

Particularly, if we look at exports and imports of Turkey during the last three decades, we can see that the exports and imports show apparent increasing trend. As it is mentioned before, Turkey began to adopt liberal economic policies with placing importance on exports since the beginning of the 1980s. However, it is seen from Figure 3 that these policies did not show their influence on the export and import values of the country during the 1980s because there was no such a significant increase seen in both export and import values. During the 1990s, the exports and imports increased more in comparison to previous decade though the trend was unsteady for imports, and reached to the value of 50 billion dollars at the end of the period. Significantly, the most prominent increase in the export and import values occurred in the last decade, which really distinct this period from the previous ones as it can apparently be followed from the figure above. If the crisis year of 2009 is excluded, during the last decade while the export values increased fourfold and reached to the level of about 130 billion dollars, the import values rose threefold and reached to the level of 200 billion dollars.

Furthermore, it is clearly observed from Figure 3 that perpetually the imports were more than the exports during the last three decades, which indicates the dominance of the imports over the exports. Particularly in the last decade, even though there is seen a rapid increase in the exports, more rapid increase is observed in the imports. This implies that foreign trade balance became worse or trade deficit increased. It can also apparently be seen from Figure 3 that especially from

the mid-2000s trade deficit increased in Turkey. While it was about 10 billion dollars in 2001, it increased to 69 billion dollars in 2008. (See Appendix, Table 1). Even though Turkey sought to keep interest rates at low levels and implemented fiscal expansion and monetary loosening policies in order to restore the economic balances, stimulate economic growth, boost foreign trade and increase exports, due to overvalued Turkish currency the volume of imports also rose and augmented the negative trade balance of the country (Temiz and Gökmen 2010). It should also be mentioned that the volume of exports and imports were significantly decreased during the crisis years of 1994, 2000/01 and 2008 though the impacts of crises on the export volumes remained more modest compare to the import volumes.

3. Theory

3.1 Previous research

The impacts of foreign trade on economic growth have been studied by many economists from various points of views. In economics literature, the effects of foreign trade have been seen as a major factor for economic growth by Grossmann and Helpman (1991); Frankel and Romer (1999); Rodrik and Rodrigez (2000); Wacziarg and Welch (2003); Alcala and Ciccone (2004). Sachs and Warner (1995) found that the growth rate of the economies with free trade regimes is higher than the closed economies. Edwards (1998) studied the relation between foreign trade and total factor productivity in 93 countries and concluded that TFP growth is faster in more open economies. The study by Lewer and Van den Berg (2003) examined the size of the relationship between international trade and growth by not just considering its statistical significance but also regarding its economic significance, and revealed that a one percentage point increase in growth of exports leads to a one-fifth percentage point increase in economic growth.

Significantly, the effects of exports on economic growth have been taken much more attention maybe due to the increasing role of export-led growth strategies in many developing countries. While some economists such as Krueger (1978); Chenery (1979); Tyler (1981); Kavoussi (1984); Balassa (1985); Ram (1985); Fosu (1990); and Salvatore and Hacter (1991) argued that export positively affect the economic growth, some others such as Kwan and Cotsomitis (1990); Ahmad and Kwan (1991); Yaghmaian (1994) came up with counter-arguments to export-led growth (Temiz and Gökmen 2010). The empirical results provided by the study of Vohra (2001) revealed that exports have a positive and significant impact on economic growth when a country achieved some level of economic development. Related with this point, Subasat (2002) found that export oriented middle-income countries grow faster relative to less export oriented countries, and exports do not have a significant impact on economic growth of low and high-income countries.

Furthermore, regarding the causality and its direction between trade openness and economic growth, there are various studies which came up with different results. Based upon various country cases, Van den Berg (1996); Ghatak et al. (1997); Frankel and Romer (1999); Wacziarg (2001); Irwin and Tervio (2002); Utkulu and Özdemir (2004) found a causal relationship from trade openness to economic growth. On the other side, Oxley (1993); Shan and Sun (1998); Sinha and Sinha (1999); Rodrik (2001); Jim and Ramesh (2005) found out the direction of causality from economic growth to trade openness. Also the studies by Afxentiou and Serletis (1992); Ghartey (1993); Riezman et al. (1996); Liu et al. (1997); Tsen (2006) suggest a bidirectional causal relationship between trade openness and economic growth.

Literature review regarding Turkish case

Actually, in the economics literature of Turkey there were not so many studies which investigate the impacts of foreign trade on economic growth of the country. However, it is recently seen that the studies related with this issue is growing in numbers possibly due to increasing importance of foreign trade in Turkish economy during recent years. Studies by Yapraklı (2007), Yücel (2009), Temiz and Gökmen (2010), Adak (2010), Kotil and Konur (2010), Öztürk and Acaravcı (2010), Çetinkaya and Erdoğan (2010) could be mentioned as significant studies in the literature. One of the common characteristics of these studies is that by using various econometric methods they seek to find out causality between different foreign trade indices, such as exports, imports and trade openness, and economic growth though one of them focuses on the relationship between growth rate of foreign trade and GDP per capita growth.

Yapraklı (2007) investigated the relationship between trade and financial openness and economic growth in Turkey during the period of 1990:1-2006:4. She used multivariate cointegration analysis, error correction-augmented Granger causality tests and vector error correction model. The results of her study reveal that while trade openness positively affects the economic growth, financial openness created negative impacts on it. It was also found that there is a bi-directional causality between trade and financial openness in Turkey.

Yücel (2009) examined also the causal relationships between financial development, trade openness and economic growth for the Turkish economy during the period of 1989-2007 in monthly basis. He used the Augmented Dickey-Fuller (ADF) for unit root test, Johansen and Juselius (JJ) for cointegration analysis, and Granger causality test for causal relationships. In similar to the findings of Yapraklı (2007), he found that while trade openness has a positive impact, financial development has a negative impact on economic growth.

Temiz and Gökmen (2010) investigated the relationship of real exports with economic growth by using annual time series data for the Turkish economy over the period 1950-2006. They applied ADF unit root test, Johansen cointegration test, vector error correction model (VECM), and Granger causality test in the study. Their study reveals that in long run there is a one-way causality from economic growth to real net exports in Turkey.

Adak (2010) analyzed the relation between foreign trade and economic growth in Turkey in the years between 1981 and 2007 by using various econometric tests. He mainly looked at the relationship between foreign trade growth and GDP per capita growth. His study shows that foreign trade growth positively and consistently affects the GDP per capita growth in Turkey.

Kotil and Konur (2010) investigated the relationship between GDP and foreign trade in Turkey during the period of 1989-2007. They performed a Granger causality test for the relationship between export, import and GDP, and found that export growth leads to GDP growth which in turn leads to import growth in Turkey. The results of study also provide supportive arguments for export-led growth hypothesis.

Öztürk and Acaravcı (2010) examined the export-led growth hypothesis for Turkish case by taking into account the period of 1989-2006 in quarterly basis. The study used the Granger non-causality in the VAR model to analyze the dynamic relationship between export growth and economic growth in Turkey. The results of the study support the export-led growth hypothesis for Turkey and shows unidirectional Granger causal flow from real exports to real GDP.

Çetinkaya and Erdoğan (2010) did VAR analysis of the relationship between GDP, import and export in Turkey in monthly basis period of 2002:01-2010:03. They found that there is causality from import to GDP, and from GDP to export. It was also shown that there is a bidirectional causal relationship between import and export.

In short, all these previous studies concluded that there is a significant relationship between foreign trade and economic growth in Turkey. In fact, this conclusion is consistent with the general argument in the literature that suggests a positive relationship between international trade and economic growth. However, the results of studies differ according to different time periods and investigated foreign trade variables especially in determining the causality and its direction in the relations. While some studies reveal the direction of causality from export to economic growth, some others reveal it the opposite way round. Actually, this point is of importance for this study because the relationship and its causal direction among import, export and GDP growth is investigated by considering the period of 1987:1-2007:3 in quarterly basis. Also, comparison of the

period 1987:1-2007:3 and 2000:1-2007:3 is done in order to see whether there was a change in the relationship between export, import and GDP growth.

3.2 Theoretical framework

3.2.1 Growth theories and foreign trade

New growth theory or endogenous growth theory provides some implications for the relationship between foreign trade and economic growth. However, under the name of new growth theory there are several approaches which examine this relationship from various points of views. Lucas (1988) analyzes the relation between international trade and economic growth from the perspective of learning by doing and comparative advantage. Accordingly, a country would specialize in the good for which the autarky endowment of human capital presented a comparative advantage, and then this specialization would likely to be reinforced because of the learning that takes place in the specialized sector. On the other hand, the relationship between foreign trade and economic growth was also examined by taking into account innovation and R&D and make them the foundation of economic growth process. Especially in analyzing the economic growth of open and closed economies Grossman and Helpman (1991) point out that international trade would have a positive impact on economic growth such a way that it facilitates or develops the base of technological knowledge, which in turn would lower the cost of product development and speed up the introduction of new varieties of goods. Significantly, while international trade likely eliminates the redundancies by allowing countries to perform different kinds of research in various areas, it provides a situation of strong competition which would foster creativity, innovation and the exploration of economies of scale in the country (Afonso 2001, 18).

Furthermore, the importance of foreign trade in economic growth is discussed in terms of its impacts on composition of investments and total accumulation of capital through allowing access to imported production factors that incorporating new and improved technologies. Therefore, the accumulation of imported capital would likely affect domestic product as an additional factor of production and as a productivity fomenter due to its technologically advanced feature (Afonso 2001, 23). Put it differently, international trade could widen the availability of intermediate goods and capital equipment which would likely make contributions to the productivity of the country's other resources. In the form of embodied capital goods, trade permits developing countries access to the improved technology of developed countries. Moreover, while trade leads to intensification of capacity utilization which cause more production and consumption, foreign trade would provide a larger market for domestic producers, and would allow them to operate at minimum required scale and to reap benefits of increasing returns to scale (Shigeyuki and Razafimahefa 2003). In general,

technology is regarded as a factor that affects the productivity which, in turn, attributes to the economic growth of a country. In that sense, technology transfer through foreign trade would become an important part of the process in economic growth. This is evaluated with the argument that supposes foreign trade to provide opportunity for a developing country to facilitate adaptation process of production technology of advanced countries which leads to a TFP growth (Yapraklı 2007).

3.2.2 Foreign trade and economic growth causality

Causality studies have gained importance during recent decades with increasing number of empirical studies in the economic growth literature. One of the main arguments of modern empirical economics is, by relying on the general understanding of macroeconomics, to consider import as a leakage of revenue which will likely lead to unemployment rather than economic growth. That is one of the reasons why a majority of the empirical studies examine the relationship between foreign trade and economic growth by focusing on the relationship between export and economic growth.

In addition, causality studies provide very diverse conclusions regarding this relationship. It can be said that there is no consensus on causality and on its direction, which is generalized for all countries. In fact, while some concludes that export has a single causal relationship with economic growth which means that export promotes economic growth, some others found that economic growth has a single causal relationship with export which means causality runs from economic growth to export growth. Also some argue that there is a two-way causal relationship between economic growth and export whereas some others assert there is no causal relationship between the two. It is seen that there are mainly four conclusions regarding causality between export and economic growth by relying on great deals of country cases. The first one says that causality runs from export to economic growth. The second says that causality runs from economic growth to export. The third and fourth conclude respectively that there is a two-way causality between economic growth and export, and there is no causal relationship between the two. This may indicate wideness of theoretical background of causality in this issue (Chen 2009).

On the other hand, there are also some studies which analyze the causal relationship between import and GDP by taking into consideration the likely impacts of import on economic growth. Like the studies which investigate relationship between export and economic growth, these studies also came up with different results. However, there should be more of these kinds of studies because it seems that the impact of import on economic growth is ignored. In fact, by referring to the discussion above, it can be argued that imported products would encourage domestic facilities/enterprises to

improve product quality and production efficiency and promote the upgrading of traditional industrial structure of a country. Furthermore, if the countries' economic development levels are taken into account, then import-economic growth relations should be reconsidered. Developed countries in general have advantage in capital and technology, but developing countries in general have comparative advantage in natural resources and labor force. Therefore, their export-import structures are shaped in such a way that major export products of these countries are generally agricultural products and low value-added items, and its import products are mainly high-tech products. In that sense, it could be argued that import is an important mean to overcome the problems of bottleneck in economic development and promote economic growth (Chen 2009).

3.2.3 Export-led growth or growth-led export

As it is stated in the above section, the relationship between foreign trade and economic growth is examined on the basis of export-growth relation. Accordingly, export-led growth or export cause growth hypothesis is being increasingly supported by many studies. There are mainly two reasons for development of export-growth literature. One of them is New Growth Theory which helps modeling the impact of determinants of growth on export. The other one is the new developments in econometrics like cointegration and causality tests which are widely used for examining the relationship between foreign trade and economic growth (Kotil and Konur 2010).

The main issue in the export-growth literature is whether causality goes from exports to economic growth as it is asserted by export-led growth hypothesis, or causality flows from economic growth to exports as it is supported by growth-led exports hypothesis. What is important regarding this issue is that depending upon the direction of this causal relationship, different implications for economic policy strategies would be provided. In particular, if causality flows from exports to growth, then it is an appropriate policy for a country to carry out export promotion strategies. However, if causality flows from economic growth to exports, then it is likely that a certain degree of development is prerequisite for a country to increase its exports, which indicates the importance of economic policies in expanding exports. Also if there is a bi-causal relationship between export and growth, then it means that both strategies could be necessary as long as they work hand in hand (Temiz and Gökmen 2010).

The basics of export-led growth hypothesis suggest that the expansion of aggregate exports have a favorable impact on economic growth through two ways. First, through an improvement in the output level via the multiplier effect, the aggregate exports contribute to the circular flow of income in the country. Second, the level of exports increases foreign exchange receipt which is triggering the imports of essential inputs in the production system (Öztürk and Acaravcı 2010). If the factors

that affect export are taken into consideration, it could be argued that the degree of international openness in terms of increasing competitiveness in domestic markets by increasing efficiency and decreasing costs would enable a country to increase its exports. Also, adoption of high technology, managerial experiences and in-depth exploration of international markets can be taken as supporting factors for exports. Significantly, one of the factors that promote exportation is to assure a sufficient amount of capital accumulation in a country, which could be provided by increasing capital inflows into the country. Thus, in that way the country is able to increase its production with new resources and to expand its exports with increasing economic growth (Temiz and Gökmen 2010).

Even though foreign trade and economic growth relationship is analyzed as export-led growth or growth-led export approaches, the above arguments indicate the importance of importation in the process of exportation and economic growth. Therefore, increasing imports could be regarded as a complementary factor to exports. A country could sustain productivity by facilitating the processes of research and development, learning, technology adaptation by relying on technology-intensive intermediate goods. Thus, imports of these intermediate products could be the basis of production of goods for exports, which implies a kind of complementarity between imports and exports (Kotil and Konur 2010). However, as in the case of exports, in analyzing the effects of import on economic growth, economic development level of a country should also be taken into account.

In short, to separate the effects of imports and exports on economic growth of a country, there are various arguments in the literature. In the general understanding of macroeconomics, import is regarded as having a negative effect on economic growth due to the assumption that import leads to unemployment while decreasing the revenue of a country. That is why the relationship between economic growth and foreign trade is generally recognized as the relationship between growth and export. However, trade theory proves that not just export but also import promotes the national economic welfare and economic growth in that the import of cheap commodities can decrease production costs and increase consumers' welfare, besides the fact that import of capital goods and technology lead to technological progress and to increased labor productivity. Therefore, the effects of import should also be taken into account in terms of GDP growth and technological progress (Li et al. 2010).

3.3 Hypotheses

Based upon the background information regarding the Turkish economy and the theoretical considerations above, it could be argued that GDP growth in Turkey during the last three decades significantly depends on foreign trade. More specifically, economic growth significantly and positively depends on export and import. However, it is hypothesized that export growth was the

major contributor to GDP growth relative to import growth during this period. In terms of causality, it is argued that causality runs from exports to GDP, and there should also be causal relationship between exports and imports.

On the other hand, increasing foreign trade should have contributed to economic growth of the country through increasing intermediate goods and capital equipment, which should have increased the output level and productivity of sectors in the country. Also, manufacturing sector, as a higher productive sector relative to agriculture and mining and quarrying, should have increased its importance in composition of export and import of the country. By taking into account the assumption that technology transfer is facilitated by foreign trade, it could be said that Turkey should have increased its technology transfer and production of high value-added goods via foreign trade.

Furthermore, in terms of making comparison between the three decades, it should be expected that in the last decade foreign trade should have contributed to economic growth more relative to previous decades, and export-import structure evolved increasingly to more high value-added products, and exports should have played a major role relative to imports in terms of contribution to economic growth.

4. Data

As it is seen in the next section, the methodology of the paper includes two different approaches which are considered as complementary to each other. The range of data for the study is quite wide. All the data regarding this study is taken from the databases of Turkstat which provides sufficient level of information and data on national accounts and foreign trade statistics of Turkey. Therefore, relying on one sufficient data resource makes it easy to generate more coherent results relative to depending on various data resources.

Regarding the first part of the methodology section, GDP, export and import data are needed for doing VAR, VEC model estimations and causality analysis among these variables. Even though we set the time period as thirty years from 1980 to 2009 for this study, there is no data for GDP, export and import before 1987. In order to increase robustness of this analysis we need to get more data on GDP, export and import. For this reason, quarterly data of GDP, export and import is taken from 1987 to 2007. Significantly, it should be mentioned here that we collect data of these variables from national account statistics of Turkstat based on GDP by expenditure approach and with 1987 constant prices. At the end, we get 83 time series data regarding econometric analysis, which seems better in comparison to yearly 20 time series data of the period 1987-2007. We use logged values in VAR, VEC model estimations and causality analysis.

In the second part of the analysis where the composition change in exports and imports is analyzed, various descriptive statistics are used in order to get better understanding on the subject. In contrast to the first analysis, sufficient data which covers the years from 1980 to 2009 has been found. Therefore, by using descriptive statistics the time period of this study can be completely analyzed. The first section of this part uses foreign trade statistics of Turkey according to Broad Economic Categorization (BEC) Level1 which categorize foreign trade data as capital goods, intermediate goods, consumption goods and others. It is important to note that only yearly data of 1980, 1990, 2000 and 2009 are taken in order to make comparison in export and import values during the three decades and to see how export and import composition change accordingly.

In the second section of this part, the data of foreign trade by major sectors is used in order to analyze the composition change of exports and imports in major sectors. Particularly, we take foreign trade statistics according to International Standard Industry Categorization (ISIC) Rev 3. This standardization categorize sectors as A - agriculture and forestry, B - fishing, C - mining and quarrying, D - manufacturing, E - electricity, gas and water supply, G - wholesale and retail trade, K - real estate, renting and business activities, O - other community, social and personal service activities. However, in the analysis we take only three major sectors which are agriculture includes sectors A-B, mining and quarrying, and manufacturing. We decide to neglect other sectors because their shares are roughly 0-1% in export and import compositions.

In the last section of the second analysis, we use foreign trade statistics by ISIC Rev 4 Level2 classification in order to observe whether there was a change or not in foreign trade composition of manufacturing sector in terms of having shift from low value-added products to high value-added products. Accordingly, we choose three low value-added product group and six high value-added product group for analyzing the change in composition of imports and exports. Manufacture of food products and beverages, manufacture of textiles, manufacture of wearing apparel are chosen as low value-added products. On the other side, manufacture of fabricated metal products, manufacture of machinery and equipment, manufacture of electrical machinery and apparatus, manufacture of radio, television and communication equipment and apparatus, manufacture of motor vehicles, trailers and semi-trailers, and other transport equipment are taken as high value-added product groups. Moreover, in this analysis, data is collected for the years 1980, 1985, 1990, 1995, 2000, 2005 and 2009 in order to see the composition change more clearly in exports and imports of these products. (For raw data see Appendix, Table 1).

5. Methods

The methodology of the paper mainly relies on two different approaches which employ various methods. In the first case, the methods of time series econometrics such as Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration test and Granger causality test under the broader framework of Vector Autoregressive (VAR) model and Vector Error Correction (VEC) model are used in order to examine the dynamic relationship between GDP, exports and imports in both short-term and long-term with finding out the causality and its direction among them. In the second case, the composition change in exports and imports of the country is analyzed by using some descriptive statistics in order to observe how foreign trade pattern of the country changed in thirty years of time and how it would have likely affected its economic growth.

5.1 Econometric model

Theoretical model of first approach is formulated as follows:

$$GDP = f(\text{Export}_t, \text{Import}_t)$$

The model hypothesizes that GDP is a function of exports and imports. Although GDP might also be affected by some other factors such as government spending and investments, they are not included in this model because we would like to examine primarily the causal relationship between economic growth and foreign trade. Also the scope of this analysis should be in line with the scope of second approach/analysis in order to get coherent results. Therefore other variables are excluded in the econometric model of this study.

5.1.1 VAR model

5.1.1.1 ADF unit root test

Before doing VAR analysis, stationary of variables should be tested because stationary of variables in first differences is a necessary condition for analyzing relationship between variables. In order to do that, ADF unit root test is used. The hypotheses in unit root tests are the following:

H₀: Time-series is not stationary or there is a unit root.

H₁: Time-series is stationary or there is no unit root.

If test statistics of a variable is less than critical value in absolute terms, then the null hypothesis cannot be rejected. Therefore, the first difference of a variable should be tested. If test statistics of a variable is more than critical value in absolute terms, then the null hypothesis can be rejected, which indicates the stationary condition of a variable.

The number of lags for unit root test is determined by referring to Akaike's Information Criterion (AIC) and Likelihood-Ratio Test.

5.1.1.2 VAR estimation

After ensuring all variables are stationary in first differences $I(1)$, VAR model can be estimated. However, it is also necessary to define lags for VAR model. The number of lags is defined based on Akaike's Information Criterion (AIC) and Likelihood-Ratio Test.

VAR model is used to analyze the interrelationship between variables in short-run by capturing the effects of current and past values of variables. That is, VAR model estimation shows the relationship among variables and indicates to what extent their effects occur on each other based on past and current values.

5.1.1.3 Granger causality test

Based on VAR estimation, Granger causality test is run in order to observe the causality and its direction among variables. This test simply checks whether or not the past values of one variable would explain or imply a change in present values of other variable. In that respect, a change in past values of one variable would enable one to predict present values of other variable. In principle, if this is the case that changes in X variable is observed and then changes in Y variable is happened, then it can be said that X Granger cause Y. In other words, if past values of X variable increases the prediction or forecasting of Y variable, then it is said that X Granger cause Y. The hypotheses of Granger causality test are the following:

$H_0: Y_t \text{ does not cause } X_t$

$H_1: Y_t \text{ causes } X_t$

where X_t and Y_t are random time series.

5.1.2 VEC model

5.1.2.1 Johansen cointegration test

Before VEC model estimation, number of cointegrating equations should be defined. In order to do that, Johansen cointegration test is run by using logged values of variables. The number of lags is defined based on the criteria that used in VAR model. By running this test, it is checked whether the variables are cointegrated or not, which indicates whether there is a long-run relationship between them. The hypotheses for this test are:

$H_0: \text{There are no cointegration relationships}$

H1: There is at most 1 cointegration relationship

5.1.2.2 VEC estimation

After running Johansen Cointegration Test and finding cointegrating vectors, VEC estimation can be done. The long-run relationship between variables can be analyzed through looking at cointegration equations. It also enables one to analyze long-run relationship with cointegrating error which implies break points or disturbances in long-run equilibrium. Moreover, short-run relationship can be observed based on changes of the logged values in VEC estimation which gives details of the relationship regarding past and current values of variables and explain causality among them.

5.2 Descriptive statistics

In this part, a different approach is used in order to analyze the roots of foreign trade pattern and its potential impacts on economic growth. Based upon theoretical considerations stated above regarding foreign trade and economic growth relationship, composition change in export and import of the country during the last three decades is sought to be analyzed. In other words, how export-import structure of the country evolved during this period of time and how could this composition change generate implications for the economic growth of the country are investigated.

Firstly, import and export structure of the country is observed in terms of capital goods, intermediate goods and consumption goods. Secondly, the importance of some major sectors in the export-import composition of the country is examined through looking at sector shares of agriculture, mining and quarrying, and manufacturing. Thirdly, the country's manufacturing sector is taken into consideration by doing analysis on shares of some certain low value-added and high value-added manufacturing product groups in the export-import composition of the country. All these three steps will likely to give insight on how and to what extent foreign trade pattern changed and how could this change implies or causes growth in the economy during the thirty years. However, it should also be noted that the general analysis of export-import composition based on descriptive statistics does not cover all aspects of foreign trade pattern, but seeks to examine the most relevant and important aspects for the relationship between foreign trade and economic growth based on some theoretical considerations.

6. Empirical Analysis

6.1 Analysis of dynamic relationship between foreign trade and economic growth

6.1.1 Analysis regarding the period 1987:1-2007:3

Before doing VAR estimation and then finding causality between variables of model we need to do unit root test for observing stationarity of time series. Accordingly, we use Augmented Dickey-Fuller unit root test. We look at whether the variables of model needed to be differenced in first order or not. That is, this step show us whether the variables have unit root or not.

Firstly, the number of lags is determined by Likelihood-Ratio Test and Akaike's Information Criterion (AIC). Also, we look at the trend of the time-series and include it in unit root test according to the different trend characteristics of time-series. (See Appendix, Table 2).

The results of Augmented Dickey-Fuller unit root tests are presented in the following table. As it is seen, the null-hypothesis is not rejected at the beginning levels of variables except for lnImport. Therefore, we need to take first differences of variables lnGDP, lnExport and lnImport in order to see whether they are stationary or not at first difference level. When we do this, we see that the null-hypothesis is rejected at the first differences. The results that are presented in the table indicate that all series are stationary. This means that dlnGDP, dlnExport dlnImport are integrated of order one, I(1).

Table 1. Augmented Dickey-Fuller unit root tests

Variables	ADF test statistics	5% Critical value	Deterministic Regressors	Lags	Results
lnGDP	-3,015	-3,472	constant + trend	4	non-stationary
lnExport	-2,952	-3,472	constant + trend	4	non-stationary
lnImport	-4,432	-3,472	constant + trend	4	stationary
dlnGDP	-4,108	-2,908	constant	4	stationary
dlnExport	-3,826	-2,908	constant	4	stationary
dlnImport	-3,826	-2,908	constant	4	stationary

Then based upon these results we can do VAR analysis. Even though there are no certain rules to select the number of lags, at least four lags should be used because the data is quarterly.³ For this analysis the number of lags is also defined as four according to the Likelihood-Ratio Test and Akaike's Information Criterion (AIC). In particular, we use LR test value as the primary determinant for lag length selection in VAR model and use AIC as a complement to the LR. The details of determination of the number of lags for VAR model can be followed from Table 2.

³ New York University, Data Service Studio, NYU Libraries & ITs, "Introduction to Stata 10 for Time Series Analysis" <http://archive.nyu.edu/bitstream/2451/29569/2/Brief%20Introduction%20to%20Stata%2010%20Time%20Analysis.pdf> (accessed March 6, 2011).

Table 2. Defining the number of lags for VAR Model

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	159,241				3,70E-06	-4,0062	-3,9699	-3,91553
1	187,938	57,394	9	0	2,20E-06	-4,5112	-4,3661	-4,14865
2	268,068	160,26	9	0	3,60E-07	-6,3351	-6,0811	-5,70057
3	357,89	179,65	9	0	4,50E-08	-8,4074	-8.04458*	-7.50102*
4	367,672	19,564*	9	0,021	4,4E-08*	-8.4275*	-7,9558	-7,24914

The results of our VAR estimation can be seen in the table below.

Table 3. VAR Model estimation results

		Coef.	Std.err	z	P value
dlnGDP	dlnGDP	0,937	0,039	23,88	0,000
	dlnExport	0,046	0,058	0,79	0,431
	dlnImport	-0,185	0,044	-4,13	0,000
	constant	0,003	0,005	0,57	0,566
dlnExport	dlnGDP	0,175	0,060	2,89	0,004
	dlnExport	0,587	0,090	6,46	0,000
	dlnImport	0,118	0,069	1,71	0,088
	constant	0,003	0,008	0,48	0,628
dlnImport	dlnGDP	-0,098	0,094	-1,04	0,298
	dlnExport	0,239	0,141	1,69	0,092
	dlnImport	0,264	0,108	2,45	0,014
	constant	0,012	0,012	1,02	0,310

From Table 3, we can see that in short-run while GDP growth rate depends significantly on the growth rate of GDP and growth rate of import in previous period; it does not significantly depend on export growth in the previous period. However, the import growth affects the GDP growth negatively. In particular, 1% increase in GDP growth rate of previous period adds 0,93% to current year's GDP growth rate. 1% increase in import growth of the previous period decreases GDP growth rate at the rate of 0,18%.

When we look at the export growth, we observe that it significantly depends on the GDP growth and growth rate of export in the previous period. It does not depend on the growth rate of imports at 5% significance level. 1% GDP growth in the previous period adds 0,17% to the export growth of current year. Increasing export growth at 1% level in the previous period contributes to current year's export growth at the rate of 0,58%. If we look at the growth rate of import, we see that it only depends on the growth rate of itself at 5% significance level. 1% increase in the import growth of previous period adds 0,26% to current year's import growth rate.

Now it would be good to have a look at causality between GDP, export, import in short-run. In order to find causality and its direction, we run Granger causality test. The results are presented in the following table.

Table 4. Granger causality test results

Null Hypothesis, H ₀	chi2	Prob > chi2
dlnGDP does not granger cause dlnExport	8,3633	0,004
dlnGDP does not granger cause dlnImport	1,0845	0,298
dlnExport does not granger cause dlnGDP	0,62131	0,431
dlnExport does not granger cause dlnImport	2,8435	0,092
dlnImport does not granger cause dlnGDP	17,03	0,000
dlnImport does not granger cause dlnExport	2,9128	0,088

As it is seen from the table, changes in the growth rate of GDP is caused by the growth rate of import but is not caused by the growth rate of export. On the other side, only the growth rate of GDP cause to changes in the growth rate of export at 5% significance level. There is causality between the export and import growth only at 10% significance level and it is bidirectional. In short, direction of causality runs from the import growth rate to the GDP growth rate and from the GDP growth rate to the export growth rate. There is also two-way causality from the export growth to the import growth at 10% significance level.

Testing the model

We test the VAR-model for stability and test residuals for normality and autocorrelation. We find that the VAR model is stable. Also we see that residuals are normally distributed. However, we find autocorrelation in residuals which means that the residuals are correlated with each other. This can be caused by misspecification of our model or by our quarterly data set which have lagged variables and -possibly- inertia. Autocorrelation indicates that t-tests of VAR model are no longer valid. In short, all the results of this model should be evaluated by taking into account the presence of autocorrelation. (For details of testing see Appendix, Table 9-10-11).

Now, in order to explore the long-run relationship between GDP, export and import, we do VEC estimation. Before doing VEC estimation, we need to do cointegration analysis for checking the variables whether they are cointegrated or not. We run Johansen cointegration test for time-series of lnGDP, lnExport, lnImport with 3 lag which is one lag less than VAR model. (We did not find cointegration equation with 4 lags). The results of the test are shown in the following table.

Table 5. Johansen cointegration test results

Trend: Constant			Number of obs = 80		
Sample: 1987q4-2007q3			Lags = 3		
maximum rank	parms	LL	eigenvalue	trace statistics	%5 critical value
0	21	272,902		73,6994	29,68
1	26	304,474	0,54583	10,5560*	15,41
2	29	309,731	0,12316	0,0412	3,76
3	30	309,752	0,00052		

As we see from test statistics in the table, we have 1 cointegration equation under the assumption that there is no cointegrating error in the equation.

Table 6. Normalized cointegrating coefficients

Normalized cointegrating coefficients			
lngdp	lnexport	lnimport	constant
1	-0,0054	-0,3865	-10,85627
p value	0,819	0,000	
s.e	0,23769	0,24645	

* denotes statistically significance level at 5%

Long-run results of VEC estimation is presented in Table 6. Accordingly, the equation is the following:

$$\ln \text{GDP} = 0,005 \ln \text{Export} + 0,386 \ln \text{Import} + 10,856$$

We see that import and GDP is significantly correlated whereas export is not significantly related with GDP. Therefore, similar to the results of VAR model, we did not find any significant relationship between export and GDP in the long-run.

From above equation we can say that 1% increase in imports would lead to 0,38% rise in GDP in the long-run.

If we analyze long-term equilibrium with cointegrating error, then our equation should be like this

$$\ln \text{gdp} - 0,005 \ln \text{export} + 0,386 \ln \text{import} + 10,856 > 0$$

(For details see Appendix, Table 13).

In this case, we need to look at the ce_1 values of variables in order to see the deviations from cointegrating values. We observe that correction error for $\ln \text{GDP}$ is statistically significant at 5% level and it is -1,45. That is, quarterly negative adjustment of $\ln \text{GDP}_t$ will deviate from its cointegrating value at the level of 1,45% of $\ln \text{GDP}_{t-1}$. We see that correction error for $\ln \text{Export}$ is not statistically significant, which means that accumulated export will not react to cointegrating error. Also, it is seen that correction error for $\ln \text{Import}$ is 1,4 and statistically significant. This means that quarterly positive adjustment of $\ln \text{Import}_t$ will be about 1,4% of deviation of $\ln \text{Import}_{t-1}$ from its cointegrating value. Overall, if we consider the long-run relationship as broken, we would say that while the GDP level and import level react against error by adjusting, export level is never adjusting.

Table 7. Vector Error Correction Model short-run results

		Coef.	Std.err	z	P value
D_lnGDP	lnGDP	0,621	0,146	4,26	0,000
	lnExport	-0,003	0,096	-0,03	0,973
	lnImport	-0,183	0,084	-2,16	0,030
	constant	0,024	0,007	3,31	0,001
D_lnExport	lnGDP	0,534	0,173	3,09	0,002
	lnExport	-0,416	0,114	-3,64	0,000
	lnImport	-0,022	0,100	-0,22	0,826
	constant	0,039	0,009	4,49	0,000
D_lnImport	lnGDP	-0,479	0,265	-1,81	0,071
	lnExport	-0,420	0,175	-2,4	0,016
	lnImport	0,252	0,153	1,64	0,100
	constant	0,036	0,013	2,69	0,007

On the other hand, if we look at the short-run results of VEC model estimation we can see that results are somewhat similar with the results of VAR model estimation. Particularly, the current GDP growth rate significantly depends on the level of GDP and import in the previous period. However, the level of import negatively affects the growth rate of GDP. 1% increase of GDP in the previous period leads to 0,62% increase in the current GDP growth rate. Increasing imports at 1% in the previous period decreases the current growth rate of GDP by 0,18% rate. Furthermore, the growth rate of export significantly depends on the level of GDP and export in the previous period. 1% increase in the GDP adds 0,53% to the current export growth. The growth rate of import significantly depends on the level of export but negatively. Also, it depends on the level of GDP in the previous period at 10% significance level. In particular, increasing export in the previous period at 1% decreases the current import growth by 0,42% rate.

In short, by taking into account the results of VEC estimation, it can be argued that in short-run GDP growth depends positively on the level of previous period's GDP level and depends negatively on the level of import in the previous period. That is, increasing imports in the previous period have a negative impact on the current GDP growth rate. Interestingly the level of export in the previous period negatively affects the growth rate of import. Furthermore, the GDP growth depends on the level of export in the previous period, not the other way round.

Testing the model

We test normality and autocorrelation of residuals for the VEC model. We see that residuals are normally distributed and there is no autocorrelation in this model. (For details of testing see Appendix, Table 14-15).

6.1.2 Analysis regarding the period 2000:1-2007:3

Now, we do one more analysis in order to see whether the last decade distinct from previous periods in terms of foreign trade and economic growth relationship. We attempt to analyze the period 2000:1-2007:3 based upon short-run VAR model analysis. Then, we can see the relationship between GDP, export and import in this period besides comparing it with the results of above analysis regarding the period 1987:1-2007:3.

Before doing VAR estimation firstly we run Augmented Dickey-Fuller unit root test. We look at the stationary of the variables in first order.

The number of lags is determined by Likelihood-Ratio Test and Akaike's Information Criterion (AIC). Also, we look at the trend of the time-series and include it in unit root test. (See Appendix, Table 16).

The results of Augmented Dickey-Fuller unit root tests can be followed from the below table. The variables $\ln\text{Export}$ and $\ln\text{Import}$ are not stationary at the beginning. Therefore, we need to take first differences of all variables $\ln\text{GDP}$, $\ln\text{Export}$ and $\ln\text{Import}$ in order to observe stationary of the variables at first difference level. We see that the null-hypothesis is rejected at the first differences. The results indicate that all series are stationary at first difference, which means that $d\ln\text{GDP}$, $d\ln\text{Export}$ and $d\ln\text{Import}$ are integrated of order one, $I(1)$.

Table 8. Augmented Dickey-Fuller unit root tests

Variables	ADF test statistics	5% Critical value	Deterministic Regressors	Lags	Results
$\ln\text{GDP}$	-5,372	-3,596	constant + trend	4	stationary
$\ln\text{Export}$	-1,152	-3,596	constant + trend	4	non-stationary
$\ln\text{Import}$	-1,014	-2,997	constant	4	non-stationary
$d\ln\text{GDP}$	-3,118	-3	constant	4	stationary
$d\ln\text{Export}$	-4,059	-2,997	constant	3	stationary
$d\ln\text{Import}$	-3,501	-3	constant	4	stationary

Then we can do VAR model estimation with these variables. However, before that we should define the number of lags for the VAR model. As it is done in the first analysis, the number of lags is determined according to the Likelihood-Ratio Test and Akaike's Information Criterion (AIC), which is four. In particular, we use LR test value as the primary determinant for lag length selection in the VAR model and use AIC as a complement to the LR. The details of determination of the number of lags for the VAR model can be seen in the following table.

Table 9. Defining the number of lags for VAR Model

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	77,2174				6,70E-07	-5,709	-5,6672	-5,56387
1	95,0414	35,648	9	0	3,40E-07	-6,3878	-6,2206	-5,80714
2	129,712	69,341	9	0	4,90E-08	-8,3624	-8,0698	-7,34629
3	169,642	79,86	9	0	4,9E-09*	-10,742	-10,3237*	-9,29004*
4	179,127	18,97*	9	0,025	5,60E-09	-10,779*	-10,236	-8,89184

Then we can proceed to VAR estimation. The results can be seen in the table below.

Table 10. VAR Model estimation results

		Coef.	Std.err	z	P value
dlnGDP	dlnGDP	0,811	0,109	7,44	0,000
	dlnExport	0,095	0,140	0,68	0,496
	dlnImport	-0,141	0,062	2,28	0,023
	constant	0,004	0,007	0,63	0,532
dlnExport	dlnGDP	0,338	0,118	2,86	0,004
	dlnExport	0,485	0,152	3,19	0,001
	dlnImport	-0,009	0,067	-0,14	0,889
	constant	0,009	0,008	1,12	0,264
dlnImport	dlnGDP	-0,417	0,229	-1,82	0,069
	dlnExport	0,313	0,295	1,06	0,289
	dlnImport	0,602	0,130	4,61	0,000
	constant	0,018	0,016	1,16	0,247

It is seen from Table 10 that the results of VAR estimation regarding the period 2000:1-2007:3 are in line with the results of first analysis regarding the period 1987:1-2007:3. In the short run, the GDP growth rate significantly depends on the growth rate of GDP and the growth rate of import in the previous period. Increasing GDP growth rate in the previous period adds 0,81% to the current year's GDP growth rate. 1% increase in the import growth rate of previous period leads to 0,14% decrease in the current GDP growth rate. Furthermore, the growth rate of export significantly depends on the growth rate of export and the GDP growth rate in the previous period. In particular, increasing GDP growth rate at 1% in the previous period adds 0,33% to the current export growth rate. 1% increase in the previous period's export growth rate contributes to the current GDP growth rate at 0,48% rate. The growth rate of import only depends on the growth rate of itself at 5% significance level. 1% increase in import growth rate of the previous period adds 0,6% to the current year's import growth rate.

Now, we can continue with running Granger causality test. The results are presented in the following table.

Table 11. Granger causality test results

Null Hypothesis, H_0	chi2	Prob > chi2
dlnGDP does not Granger cause dlnExport	8,2015	0,004
dlnGDP does not Granger cause dlnImport	3,3184	0,069
dlnExport does not Granger cause dlnGDP	0,46439	0,496
dlnExport does not Granger cause dlnImport	1,1246	0,289
dlnImport does not Granger cause dlnGDP	5,1914	0,023
dlnImport does not Granger cause dlnExport	0,0196	0,889

Like in the first analysis, the results indicate that causality runs from import growth rate to GDP growth rate and from GDP growth rate to export growth rate. That is, the growth rate of import Granger-cause the changes in the growth rate of GDP and the growth rate of export is Granger-caused by the changes in the growth rate of GDP. In general, the results of this analysis suggest that there is a one-way causality from import growth to GDP growth and from GDP growth to export growth in the short-run. Also there is causality from GDP growth to import growth at 10% significance level.

Concisely, the results of VAR analysis regarding the period 2000:1-2007:3 do not point out any difference in comparison to the results regarding the period 1987:1-2007:3. This might mean that the foreign trade pattern of the seven years did not differ from the characteristics of the whole period of twenty years. It is a fact that both imports and exports excessively increased especially between the years 2002-2008. However, this increasing trend does not imply a divergence from the traditional trade pattern of Turkey. As the above analyses indicate, the country's GDP growth does not depend on its export growth, but the other way round. That is, the GDP growth stimulated the growth of exports in Turkey during both of the periods. On the other side, there is found a significant but negative relationship between the import growth and the GDP growth in both of the periods if we consider the short-run results. However, we found a positive and significant relationship between imports and GDP growth in the long-run. It is also revealed that the causality runs from import growth to GDP growth in the short-run.

Testing the model

We test stability of the model and look at normality and autocorrelation of residuals. We see that the model is stable, residuals are normally distributed and there is no autocorrelation in this model. (For details of testing see Appendix, Table 23-24-25).

6.2 Analysis of composition change in foreign trade

In this part, composition change in exports and imports of Turkey within the thirty years of time, 1980-2009, is analyzed by using some descriptive statistics. First of all, export and import structure

of the country is observed according to BEC standardization of foreign trade statistics. That is, we observe whether there was a change in export-import structure of the country in terms of capital goods, intermediate goods and consumption goods. Secondly, we analyze the change in major sectors of the economy such as agriculture, mining and quarrying, and manufacturing. By doing this, we likely see which sectors became more important in the foreign trade during the thirty years. Thirdly, based on the second step, manufacturing sector in Turkey is examined by looking at certain product groups with referring to ISIC Rev3 Level2 classification of foreign trade statistics. This part of analysis provides insight on the issue whether there was a change in foreign trade pattern of the country in terms of implying a shift from trading low value-added products to high value-added products during the last three decades. Overall, the analysis gives some explanations for the relationship between foreign trade and economic growth based on some theoretical considerations.

Table 12. Share of product groups in export composition by BEC standardization

Export Composition by BEC standardization			
Years	Capital Goods	Intermediate Goods	Consumption Goods
1980	0,02	0,52	0,46
1990	0,02	0,46	0,51
2000	0,08	0,42	0,50
2009	0,11	0,49	0,40

Source: Turkstat

If we look at the change in the export composition of Turkey in terms of capital, intermediate and consumption goods, from above table we can see that intermediate goods constitute more than half of the exported items in 1980. While consumption goods were 46% of exports, capital goods were just 2% of total exports in that year. Then in 1990, the change occurred in between intermediate and consumption goods in a way that intermediate goods lost about 6% percent of its share whereas consumption goods gain 5% share in the exports. Also, we see from the statistics of the year 2000 that capital goods were the most important product group during the 1990s in terms of gaining a high shares in the export composition of the country while intermediate and consumption goods lost their shares slightly. In the last decade, we can easily see that the share of consumption goods declined significantly whereas capital and intermediate goods increased their shares. Overall, from the beginning of the 1980s to the end of the 2000s, we observe that the most prominent change in the export composition originated from capital goods which increased their export shares about fourth fold.

Table 13. Share of product groups in import composition by BEC standardization

Import Composition by BEC standardization			
Years	Capital Goods	Intermediate Goods	Consumption Goods
1980	0,10	0,85	0,05
1990	0,18	0,72	0,09
2000	0,21	0,66	0,13
2009	0,15	0,71	0,14

Source: Turkstat

In analyzing import composition, as it follows from above table, we can see that intermediate goods were the most imported product groups in 1980 with composing 85% of the total imports. Capital and consumption goods' share were very modest in that year. When we look at the 1990's statistics, we see that there was an apparent change in the import composition. In particular, capital and consumption goods gained important shares from intermediate goods. This trend can also be seen during the 1990s. However, after the year of 2000, it is observed from the statistics that while capital goods lost important share, intermediate goods gained evident share in the import composition. Therefore, it seems that increasing trend in the share of imported capital goods turned to be negative whereas decreasing trend in the share of imported intermediate goods became positive in the last decade. Consumption goods, on the other hand, increased its shares steadily during the thirty years period.

In general, it could be said that during the last three decades intermediate goods were the most important product group in the export-import composition of Turkey. However, even though they experienced a clear decline in their shares in 1980s and 1990s, their importance increased in the last decade relative to other product groups. While the share of consumption goods in exports decreased in last two decades, their shares in imports steadily increased. During the three decades capital goods increased its shares in total exports, but decreased in total imports though their shares clearly rose in the 1980s and 1990s.

Consequently, what we can infer from these facts is that while intermediate goods lost their importance in both total imports and exports, capital and consumption goods gained importance during the 1980s and 1990s where boom-bust growth trend was highly experienced by Turkey. Interestingly, in the last decade where Turkey experienced more rapid and steady growth relative to previous two decades, intermediate goods distinctively increased their shares in both total exports and imports, and the share of capital goods decreased in imports and increased in the export composition whereas consumption goods experienced the opposite trend relative to capital goods during this period. In that regard, it can be argued that the growth trend in foreign trade of Turkey in

the last decade likely depended on the growth of import and export of intermediate goods relative to the growth of import and export of capital and consumption goods. Similar trends in import and export of intermediate goods implies that importation of these goods would likely caused to productivity increases in production facilities of the country, which in turn led to more exports in intermediate and capital goods.

In the second part of our analysis, now we turn to the export-import composition according to three major sectors in the Turkish economy.

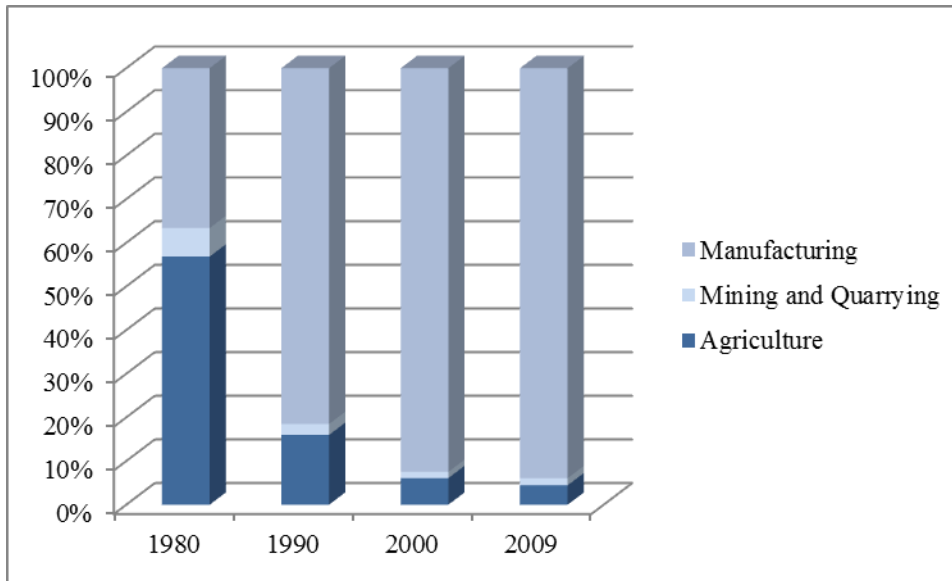


Figure 4. Composition of exports by sectors. *Source: Turkstat*

It is clearly seen from above figure that agriculture was the major sector in the export composition of the country at the beginning of the 1980s. Export of manufacturing goods was about 40 percent of the total export value, which may also indicate the backward position of manufacturing sector relative to agriculture sector in the Turkish economy. The share of mining and quarrying seems modest in comparison to agriculture and manufacturing sectors. If we look at the 1990's values, we can see a substantial change in the export composition of the country. While the share of agriculture in export decreased drastically, the share of manufacturing sector increased more than a double within ten years of time and became the major sector for exports. Mining and quarrying lost more than half of its shares in the export composition during the 1980s. Significantly, if we look at the figures of 2000 and 2009, we can easily observe that while the share of agriculture, mining and quarrying sectors in exports decreased, the share of manufacturing sector increased and reached a very high value of 93 per cent.

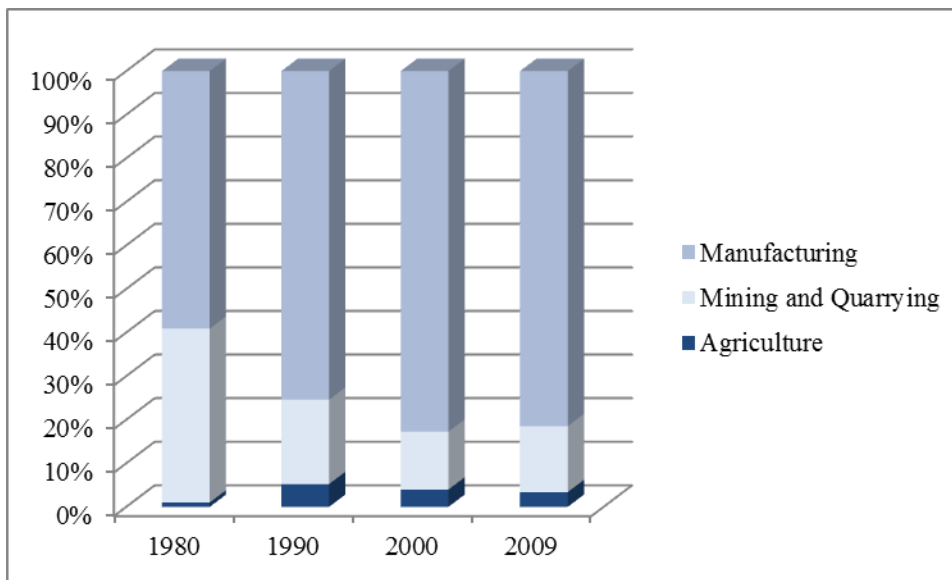


Figure 5. Composition of imports by sectors. *Source: Turkstat*

On the other side, by taking into account the figures above, it seems that change in the import composition of Turkey followed somewhat different path relative to change in the export composition during the last three decades. Agricultural products were the least imported items in 1980, whereas manufacturing goods were the mostly imported items, which actually show the inverse pattern with regard to the pattern of exports. Interestingly, the share of mining and quarrying sectors in imports was 40 percent and it may indicate the insufficient use of mines and quarries due to lack of production bases or technologies in that time. The imports figure of 1990 shows that manufacturing was the leading sector in imports, with capturing most of its share from mining and quarrying sectors. It is also seen that agriculture and other sectors increased their shares during the 1980s. If we have a look at the 2000 and 2009 figures, we see that there was an increasing trend in share of manufacturing during the 1990s even if it was not at a high level, but during the 2000s the share of manufacturing slightly declined whereas mining and quarrying and other sectors increased their shares in imports.

In fact, if we look at the thirty years of foreign trade statistics from a general point of view we can argue that Turkey experienced a considerable shift in its import-export composition. In course of time the share and importance of the agricultural sector in foreign trade markedly decreased. It might mean that Turkey started to utilize its own agricultural sources efficiently in order to meet the demand of its increasing population during that period of time. While the agricultural sector's share of exports decreased dramatically, the share of imports only changed slightly, which indicates the role of increasing domestic demand for this sector in the country. The interesting fact regarding the role of mining and quarrying sector is that Turkey prominently reduced its dependency on outside supply during this period because the share of this sector in imports declined by more than half. This implies that Turkey became more efficient in using and utilizing its mines and quarries for

supplying some parts of its energy need. Significantly, the most apparent change occurred in the shares of manufacturing sector in the foreign trade composition. Manufacturing became the leading sector for both imports and exports of the country with 93 and 79 percent shares respectively. This likely implies a structural shift from agriculture to manufacturing during the last three decades in Turkey. Therefore, it can be argued that the country's resources were reallocated towards manufacturing sector.

Now, in order to see more details of composition change in manufacturing sector, let's look at some statistics regarding certain product groups according to ISIC Rev3 Level2 classification. In this part of analysis, we attempt to see whether there was a shift or not from low value-added products to high value-added items in manufacturing. As it is seen in the tables, nine product groups are chosen as representative for low value-added and high valued-added products. In particular, manufacture of food products and beverages, manufacture of textiles, manufacture of wearing apparel are chosen as low value-added products. Furthermore, manufacture of fabricated metal products, manufacture of machinery and equipment, manufacture of electrical machinery and apparatus, manufacture of radio, television and communication equipment and apparatus, manufacture of motor vehicles, trailers and semi-trailers, and other transport equipment are taken as high value-added product groups.

Table 14. Percentage share of some manufacturing product groups in exports

	Food products and beverages	Textiles	Wearing apparel	Fabricated metal products	Machinery and equipment	Electrical machinery and apparatus	Radio, television and communication equipment and apparatus	Motor vehicles, trailers and semi-trailers	Other transport equipment
1980	7,1	12,0	4,5	0,4	0,8	0,1	0,2	1,7	0,1
1985	7,1	15,4	12,9	1,8	4,9	1,1	0,4	1,1	0,1
1990	8,1	13,7	22,3	1,3	1,5	1,3	1,9	1,3	0,5
1995	10,7	15,7	23,4	1,8	3,1	2,6	1,2	3,8	0,5
2000	6,6	16,6	19,5	2,4	5,0	3,0	3,5	6,3	3,2
2005	5,8	11,9	13,5	3,7	6,6	2,6	4,3	13,9	2,3
2009	5,8	9,4	9,4	4,4	7,9	4,0	1,9	12,6	2,4

Source: Turkstat

At first, if we observe Table 14 regarding exports of manufacturing products, we see that the share of manufactured food products and beverages did not change so much during the thirty years of time. Nevertheless, after the mid-1990s it is seen that this product group lost its share year by year. The share of manufacture of textiles and wearing apparels changed more in comparison to food products and beverages. Actually, these two groups together constitute roughly 25-30 percent of the exports in Turkey during the last three decades. However, these goods lost their shares markedly after the year of 2000. On the other side, the shares of manufacturing of the high value-added

products in exports generally show an upward trend. Especially from the beginning of the 1990s, their shares apparently increased even in different extents. The most prominent rise was experienced by manufacture of motor vehicles, trailers and semi-trailers, and other transport equipment. If we take the period 1990-2009, we see that the share of these product groups rose almost ten-fold. Also, manufacture of machinery and equipment, electrical machinery and apparatus, radio, television and communication equipment experienced an evident increase in its shares in exports. Overall, it is clearly seen that especially in the last decade there was a shift in the export composition of Turkey in terms of change from the low value-added products to the high value-added products.

Table 15. Percentage share of some manufacturing product groups in imports

	Food products and beverages	Textiles	Wearing apparel	Fabricated metal products	Machinery and equipment	Electrical machinery and apparatus	Radio, television and communication equipment and apparatus	Motor vehicles, trailers and semi-trailers	Other transport equipment
1980	3,3	1,1	0,0	3,0	7,8	2,2	1,1	1,5	0,8
1985	3,7	1,5	0,0	0,9	11,7	2,1	4,0	3,5	2,8
1990	4,2	2,0	0,1	1,3	14,3	3,1	3,7	5,7	2,3
1995	5,0	4,5	0,2	1,7	13,8	2,7	2,9	5,0	5,8
2000	2,1	3,4	0,5	1,6	10,7	2,9	7,3	10,9	2,7
2005	1,8	3,4	0,6	1,7	10,5	3,6	3,9	10,6	1,6
2009	2,1	3,1	1,3	1,9	8,9	4,7	3,3	7,6	2,3

Source: Turkstat

Secondly, if we look at the import shares of selected manufacturing products, we see that they show somewhat different trend relative to the export figures. The low value-added manufacturing products display a non-uniform trend in its shares in imports. Generally during the course of thirty years, textiles and wearing apparels were together more imported relative to food products, but their shares were very low when we make comparison with export shares. Furthermore, the imports of these kinds of products increased during crisis years and decreased afterwards. On the other hand, we could not see also any uniform or linear trend in shares of the high value-added manufacturing products. (See Appendix, Graph 5-6). However, manufacture of machinery and equipment kept on its importance among the high value-added products during the thirty years. Interestingly, till the beginning of 2000s, the import share of manufacture of motor vehicles, trailers and semi-trailers was higher than its export share, but then the sector increased its importance in exports whereas its importance in imports remained modest and even declined. Also, if we look at the total import of electrical machinery and apparatus, radio, television and communication equipment and apparatus, we can see that these product groups increased their shares rapidly from the mid-1990s to the year of 2000, and then they lost their shares which came to roughly the level of before 1995.

In short, based upon the discussion above it can be said that there was a clear shift in the export composition of Turkey from low value-added products to more high value-added products. The changing pattern could be seen more apparently when we compare the last decade with the previous two decades. While the export share of machinery manufactures increased steadily from the beginning of the 1990s to the end of the 2000s, its share in imports decreased during the last decade, which indicates that Turkey started to use its production resources more efficiently by less depending on outside supply. In fact, the most prominent manufacturing sector of the last 15 years was motor vehicles, trailers and semi-trailers with a rapid growth performance in exports and with a modest trend in import shares. The other notable manufacture sector was ICT due to its fast increasing share in imports during the last five years of the 1990s. It can also be argued that changing shares of these two sectors with regard to economic crises of dot.com in 2000 and to the last global financial crisis in 2008 indicates that Turkey became more and more engaged into the world economy.

6.3 Discussion

In this section, we make general discussion of the results of our three analyses and examine the hypotheses of the thesis based upon the results.

The first analysis provides some different implications for the relationship between foreign trade and economic growth in Turkey during the period 1987:1-2007:3. Firstly, VAR model estimation shows that in the short-run the GDP growth significantly depends on the GDP growth and import growth in the previous period. However, the relation between import and GDP growth is negative. Interestingly, the GDP growth does not significantly depend on the export growth. On the other hand, it is found out that while the export growth significantly depends on the growth rate of export and the GDP growth in the previous period, the import growth only depends on the growth of import in the previous period. In terms of causality, it is revealed that the growth of import cause to a change in the growth of GDP and the GDP growth cause to a change in the export growth whereas there is found bidirectional causality between export growth and import growth at 10% significance level. In other words, the direction of one-way causality runs from import growth rate to GDP growth rate and from GDP growth rate to export growth rate, and there is a two-way causality between export growth and import growth.

Secondly, the results of VEC estimation regarding short-run support the results of VAR estimation except for import growth which is found significantly and negatively depends on the level of export in the previous period. In general, we can argue that in the short-run GDP growth of Turkey depends only on the GDP growth/level and the import growth/level in the previous period.

Furthermore, the results of VEC model estimation regarding long-run show that while the import growth is significantly and positively correlated with the growth rate of GDP, the export growth is not significantly related with the GDP growth rate. Unlike the short-run results, the level of import in the previous period has a positive impact on the current level of GDP in the long-run.

By considering these implications from the first analysis, we can make discussion on three main points.

- 1- It is found a significant and negative relationship between GDP growth rate and the import growth rate, which agree with the general theoretical bases of macroeconomics based on the assumption that import would likely increase unemployment while decreasing the revenue and yet negatively affects the economic growth of a country. In that regard, the results of this analysis do not support some theoretical considerations under the name of trade theory like not just export but also import promotes the national economic welfare and economic growth through decreasing production costs, increasing consumers' welfare, facilitating technological progress and increasing labor productivity. Thus, we cannot confirm the hypothesis based on short-run results that economic growth significantly and positively depends on the growth of import. However, we can accept it if we consider long-run results of the analysis.
- 2- One-way causality from GDP growth to export growth implies that during the period 1987:1-2007:3, the GDP growth was one of the determinants of the export growth in Turkey. Interestingly, the export growth was not the determinant of the GDP growth as it opposes to the bases of export-led growth strategies. Both short-run and long-run estimation results give similar results regarding this point. Therefore, we argue that growth-led export hypothesis sounds more accurate in comparison to export-led growth hypothesis in Turkey during the period 1987:1-2007:3. In other words, we cannot confirm the hypothesis that export growth was the major contributor to GDP growth relative to import growth during this period. Also from causality point of view, we cannot accept the hypothesis which suggests that causality runs from export growth to GDP growth.
- 3- The results of VAR and VEC estimations regarding the relationship between export and import contradict. However, if we take into account autocorrelation problem of the first VAR model, we can accept the results of VEC model, though VAR estimation results suggest a significant relationship between export growth and import growth. That is, we can conclude that there is no significant relationship between export and import in the period 1987:1-2007:3. These results do not comply with the common argument in Turkey that

supposes exports have been mainly supported by increased imports with regards to the general trend of exports and imports in the country. Therefore, we cannot find support for the hypothesis that there should be causality between exports and imports.

The second analysis regarding the period 2000:1-2007:3 was conducted in order to see whether this period show different foreign trade pattern compare to the whole period 1987:1-2007:3. However, it generated somewhat similar results with the first analysis. The results of VAR estimation suggest that in the short-run GDP growth rate positively depends on the growth rate of GDP in the previous period, and it negatively depends on the growth rate of import in the previous period. Moreover, while export growth depends on the GDP growth rate and the growth rate of export in the previous period, the growth rate of import only depends on the growth rate of import in the previous period. The results of Granger causality test indicate that one-way causality runs from import growth to GDP growth and from GDP growth to export growth. Unlike the results of the first analysis, there is not found any significant causal relationship between export growth and import growth during the period 2000:1-2007:3. This result is quite surprising because exports and imports of the country shows very rapid growth during this period of time compare to the previous periods. We expected a significant relationship between the two by considering some theoretical arguments which assert that imports could be a complementary factor to exports through facilitating the process of research and development, learning and technology adaptation which in turn constitutes the basis of production of goods for exports. In discussion below, this point is analyzed in more detail. In short, by taking into account the results of this analysis we cannot confirm the hypothesis that economic growth depends on the growth of export, we cannot support the argument that causality runs from export growth to GDP growth, and we cannot verify the hypothesis that there is causality between exports and imports. As this analysis shows, the general feature of the relationship between foreign trade and economic growth in the period 1987:1-2007:3 did not change in the period 2000:1-2007:3 even though this period clearly distinct from previous periods in terms of foreign trade volumes and patterns.

The third analysis distinctly covers the period 1980-2009 and gives three main results regarding the composition change in exports and imports of Turkey.

- 1- Intermediate goods were the most important product group in the export-import composition of Turkey during the last three decades. Even though the share of this product group in exports and imports decreased during the 1980s and 1990s, in the last decade it markedly increased. On the other side, while the share of consumption goods in exports decreased during the last two decades, its share in imports increased. Unlike this trend, the share of

capital goods increased during this period of time but decreased in imports during the last decade. It is important to note that while intermediate goods lost their importance in both exports and imports, capital and consumption goods came forward in export and import composition during the first twenty years of the period where boom-bust growth trend was experienced by Turkey. However, in the last decade where more rapid and steady growth was experienced by the country, intermediate goods gained importance in both exports and imports as following similar trends relative to capital and consumption goods. Therefore, it can be argued that the growth of Turkish foreign trade during the last decade depends on the exports and imports of intermediate goods. Also this indicates a kind of process that imports of intermediate goods would have likely led to improvements in production facilities of the country, which in turn caused more exports in intermediate and capital goods besides leading to economic growth. Thus, we found support for the hypothesis that increasing foreign trade should have contributed to economic growth of the country through increasing intermediate and capital goods which should have increased the output level and productivity of sectors in the country.

- 2- In analyzing sectors' share in the export and import composition, we came up with the general result that Turkey experienced a clear shift in its foreign trade composition from agricultural sector to manufacture sector during the last three decades. The share of agricultural sector in exports decreased substantially while it slightly increased in imports, which might mean that the country utilized its own agricultural sources more efficiently in order to compensate the increasing domestic demand related with rising population. Also, the share of mining and quarrying sector in imports decreased more than half while it did not change so much in exports. This possibly means that Turkey markedly reduced its dependency on outside supply which indicates more efficient use or utilization of mines and quarries for meeting the energy need to some extent. Significantly, the manufacture sector became the leading sector in exports while maintained its leading position in imports with very high levels of share. The results clearly imply a structural change in export-import composition from the agricultural sector to the manufacture sector. Thus, we confirm the hypothesis that the manufacturing sector as a higher productive sector should have increased its importance in foreign trade of the country. This also complies with the argument that foreign trade helps to develop production facilities and technology base of a country through improving factor productivity, production and technological level, which in turn led to expansion of domestic markets.

- 3- By taking into account the change in some manufacturing product groups in exports and imports, we observed that high value-added products gained substantial shares in the export composition while the share of low value-added products decreased. Actually this trend is seen more apparently in the last decade relative to the previous two decades. Regarding the import composition, we could not observe any uniform trend for both high value-added and low value-added products. However, we saw that the share of manufacture of motor vehicles, trailers and semi-trailers distinctively increased in both exports and imports in the last decade. Also we observed a notable increase in the share of manufacture products in imports regarding ICT sector especially between the years 1995-2000. From these results, we can confirm the hypothesis that Turkey should have increased its technology transfer and production of high value-added goods via foreign trade based upon the assumption that technology transfer as contributor to productivity increased and thus economic growth was facilitated by foreign trade. We also found supportive results to the argument that export-import structure should have evolved increasingly to more high value-added products in the last decade and exports should have played a major role relative to imports in terms of contribution to economic growth.

7. Conclusion

The main objective of this study has been to analyze the relationship between foreign trade and economic growth in Turkey during the last three decades while particularly observing the distinctive feature of the last decade in terms of foreign trade and economic growth relationship. In other words, by comparing the last decade with the previous two decades, the thesis has mainly sought to find out how and to what extent foreign trade factors contributed to the economic growth of Turkey.

Accordingly, we have adopted two main methodological approaches and have done three analyses in order to get appropriate answers to our research problem. Firstly, we have performed some econometric methods such as Augmented Dickey-Fuller unit root test, Johansen cointegration test, Granger causality test under the framework of Vector Autoregressive (VAR) model and Vector Error Correction (VEC) model. By using these methods and models we have made two econometric analyses regarding period 1987:1-2007:3 and 2000:1-2007:3 and have examined the dynamic relationship between GDP, exports and imports in both short-term and long-term besides investigating the causality and its direction among them. Secondly, by using some descriptive statistics we have done the analysis of composition change in foreign trade of Turkey and its likely impacts on the economic growth during the period 1980-2009.

We conclude from the first and second analyses that during the period 1987:1-2007:3 the economic growth of Turkey did not depend on the growth of export, but it depended on the growth of import. Even though the short-run results show a negative relationship between import growth and GDP growth, the long-run results suggest that the relationship between the two is positive. Therefore, we can accept the hypothesis that imports positively affect economic growth. It is also supported from the results of the third analysis which suggest that increasing imports of intermediate goods especially in the last decade, changing pattern of export-import structure in the last three decades from agricultural sector to manufacture sector, and from low value-added products to high value-added products should have increased the output level and productivity of sectors which in turn should have contributed to the economic growth of Turkey.

The results of the first and the second analyses also support the growth-led export hypothesis instead of the export-led growth hypothesis during the periods 1987:1-2007:3 and 2000:1-2007:3. Based on the results of these econometric analyses, we cannot say that export was the main determinant of economic growth in Turkey during these periods. In fact, the results contrast with the results of third analysis which shows that manufacturing, as a high productive sector, and high value-added products became more and more important in export composition during the last three decades. In that respect, increasing exports should have increased the output level and the circular flow of income in the country, and also should have boosted the foreign exchange receipts which should have triggered the imports of essential inputs in the production system. Thus, increasing exports should have contributed to the economic growth of Turkey during the last three decades. However, it is not supported by the results of econometric analyses for the periods 1987:1-2007:3 and 2000:1-2007:3.

Furthermore, regarding the relationship between exports and imports, the results of first and third analyses does not support each other. It has been revealed that there is no significant causality between exports and imports in period 1987:1-2007:3 and 2000:1-2007:3. This may not be supported by the third analysis which shows that intermediate goods displayed similar increasing and decreasing trends in both exports and imports. However, from the results of third analysis we cannot make a general conclusion on the relationship between exports and imports because they do not give supportive results for capital and consumption goods. Therefore, we do not accept the argument that supposes export growth has been mainly supported by increased import growth in Turkey. Generally speaking, even though the third analysis provides implications for the distinctive feature of the last decade regarding foreign trade pattern, they are not fully supported by the econometric analyses.

In general, the analyses regarding different periods based on two methods have generated somewhat robust and consistent results, even though they have provided contrasting results in some points. The different time periods regarding each two methods can be seen as one of the shortcomings of this thesis especially in terms of analyzing the results in a comparative manner. Furthermore, even though we have defined our econometric model based on the variables GDP, export and import, for further research it would be a good approach to add gross fixed capital formation or investments and government spending into the model in order to find out foreign trade-economic growth relation by considering different interrelationships.

In conclusion, the results of our analyses mainly point out that imports was one of the significant determinants of the economic growth in Turkey during the periods 1987:1-2007:3 and 2000:1-2007:3 whereas exports did not have important impacts on the economic growth. On the contrary, the growth of exports was significantly affected by the GDP growth which indicates growth-led export pattern in Turkey during these periods. There was also no significant relationship between exports and imports. On the other side, the export-import structure and foreign trade pattern of Turkey crucially changed during the last three decades, especially in the last decade, in such a way that the weight of agricultural sector shifted to manufacture sector and high value-added products increasingly took the place of low value-added products in terms of shares in the export-import composition. All these factors should have contributed to the economic growth of Turkey in the last decade if we take into account the theoretical context of the thesis. However, we could not find any supportive results based on econometric analyses for the argument supposes that the last decade distinct from the previous decades in terms of foreign trade - economic growth relationship, though we found out the distinctive characteristic of foreign trade pattern of Turkey in the last decade according to analyses of the descriptive statistics.

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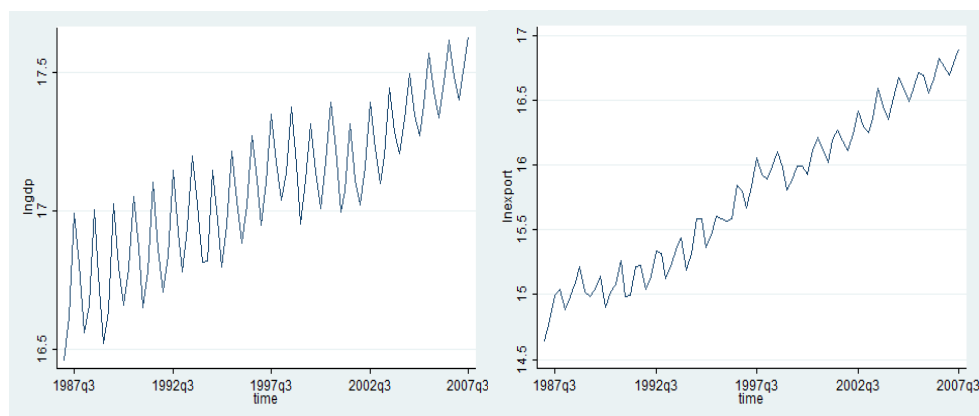
Appendix

Table 1. GDP and Foreign Trade Data, in Dollars

Year	GDP	Exports	Imports
1980	94.260.000.000	2.910.121.619	7.909.364.105
1981	95.500.000.000	4.702.934.406	8.933.373.864
1982	86.770.000.000	5.745.973.370	8.842.665.488
1983	82.910.000.000	5.727.833.673	9.235.002.089
1984	80.640.000.000	7.133.603.594	10.757.032.353
1985	90.380.000.000	7.958.009.699	11.343.376.345
1986	101.800.000.000	7.456.725.601	11.104.771.288
1987	117.180.000.000	10.190.049.416	14.157.806.908
1988	122.130.000.000	11.662.024.117	14.335.397.805
1989	144.030.000.000	11.624.691.720	15.792.142.914
1990	202.380.000.000	12.959.287.612	22.302.125.589
1991	202.720.000.000	13.593.462.021	21.047.013.873
1992	213.580.000.000	14.714.628.825	22.871.055.114
1993	242.140.000.000	15.345.066.893	29.428.369.530
1994	174.450.000.000	18.105.872.075	23.270.019.027
1995	227.510.000.000	21.637.040.881	35.709.010.773
1996	243.900.000.000	23.224.464.973	43.626.642.496
1997	255.070.000.000	26.261.071.548	48.558.720.673
1998	269.130.000.000	26.973.951.738	45.921.391.902
1999	249.820.000.000	26.587.224.962	40.671.272.031
2000	266.440.000.000	27.774.906.045	54.502.820.503
2001	195.550.000.000	31.334.216.356	41.399.082.953
2002	232.280.000.000	36.059.089.029	51.553.797.328
2003	303.260.000.000	47.252.836.302	69.339.692.058
2004	392.210.000.000	63.167.152.820	97.539.765.968
2005	482.690.000.000	73.476.408.143	116.774.150.907
2006	529.190.000.000	85.534.675.518	139.576.174.148
2007	649.130.000.000	107.271.749.904	170.062.714.501
2008	730.320.000.000	132.027.195.626	201.963.574.109
2009	614.470.000.000	102.142.612.603	140.928.421.211

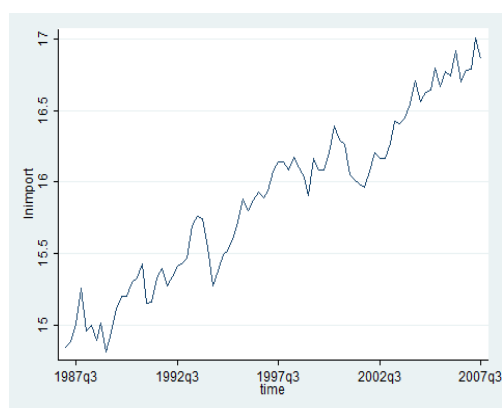
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Graph 1a, 1b, 1c. Shows trends for the variables lnGDP, lnExport and lnImport (1987:1-2007:3)



1a

1b



1c

Table 2. Shows the number of lags for the variables lnGDP, lnExport and lnImport (1987:1-2007:3)

. varsoc lngdp

Selection-order criteria
Sample: 1988q1 - 2007q3

Number of obs = 79

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-5.47023				.068971	.163803	.17582	.193796
1	24.2753	59.491	1	0.000	.033313	-.563932	-.5399	-.503946
2	24.766	.98142	1	0.322	.033746	-.551039	-.51499	-.46106
3	79.2819	109.03	1	0.000	.008707	-1.90587	-1.85781	-1.7859
4	119.29	80.017*	1	0.000	.003243*	-2.89342*	-2.83334*	-2.74346*

Endogenous: lngdp

Exogenous: _cons

. varsoc lnexport

Selection-order criteria
Sample: 1988q1 - 2007q3

Number of obs = 79

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-70.418				.357069	1.80805	1.82007	1.83804
1	46.7551	234.35	1	0.000	.018856	-1.13304	-1.10901	-1.07305
2	47.1834	.85655	1	0.355	.019132	-1.11857	-1.08252	-1.02859
3	79.6925	65.018	1	0.000	.008617	-1.91626	-1.8682	-1.79629
4	96.0381	32.691*	1	0.000	.005843*	-2.30476*	-2.24468*	-2.1548*

Endogenous: lnexport

Exogenous: _cons

```
. varsoc lnimport
```

Selection-order criteria
Sample: 1988q1 - 2007q3

Number of obs = 79

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-67.4325				.331076	1.73247	1.74449	1.76246
1	54.4503	243.77	1	0.000	.015518	-1.32786	-1.30382	-1.26787*
2	55.9076	2.9144	1	0.088	.01534	-1.33943	-1.30338	-1.24945
3	56.0452	.27524	1	0.600	.01568	-1.3176	-1.26953	-1.19763
4	59.5699	7.0494*	1	0.008	.01471*	-1.38152*	-1.32144*	-1.23155

Endogenous: lnimport
Exogenous: _cons

Table 3. Shows the results of ADF unit root tests for the variables lnGDP, lnExport and lnImport (1987:1-2007:3)

```
. dfuller lngdp, trend regress lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 78

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
z(t)	-3.015	-4.088	-3.472	-3.163

Mackinnon approximate p-value for Z(t) = 0.1280

D.lngdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnngdp					
L1.	-.3588703	.1190405	-3.01	0.004	-.5962303 -.1215103
LD.	-.0401909	.1405676	-0.29	0.776	-.3204747 .2400928
L2D.	-.1716676	.1221933	-1.40	0.164	-.4153141 .0719788
L3D.	-.1951489	.1022228	-1.91	0.060	-.3989753 .0086775
L4D.	.6104495	.0923587	6.61	0.000	.4262915 .7946075
_trend	.0034397	.0011152	3.08	0.003	.0012161 .0056634
_cons	5.992149	1.984841	3.02	0.004	2.034488 9.94981

```
. dfuller lnexport, trend regress lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 78

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
z(t)	-2.952	-4.088	-3.472	-3.163

Mackinnon approximate p-value for Z(t) = 0.1461

D.lnexport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnexport					
L1.	-.3076229	.1042216	-2.95	0.004	-.5154349 -.0998109
LD.	-.1364506	.1301317	-1.05	0.298	-.3959258 .1230245
L2D.	-.3012	.1191856	-2.53	0.014	-.5388494 -.0635507
L3D.	-.2157632	.106496	-2.03	0.047	-.4281102 -.0034162
L4D.	.470049	.097977	4.80	0.000	.2746885 .6654095
_trend	.0079904	.00263	3.04	0.003	.0027464 .0132344
_cons	4.544006	1.529927	2.97	0.004	1.493418 7.594595

```
. dfuller d_lnimport, trend regress lags(4)
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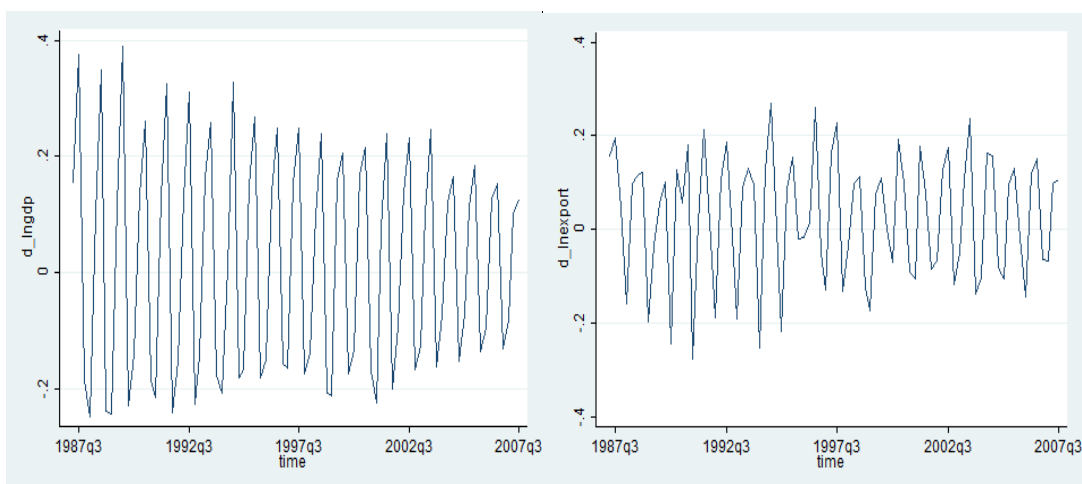
Augmented Dickey-Fuller test for unit root Number of obs = 77

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-5.629	-4.091	-3.473	-3.164

Mackinnon approximate p-value for Z(t) = 0.0000

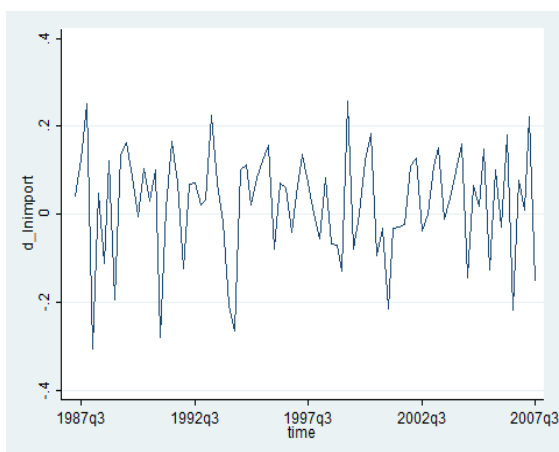
D.d_lnimport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
d_lnimport						
L1.	-1.544882	.2744371	-5.63	0.000	-2.092229	-.9975345
LD.	.5758201	.24707	2.33	0.023	.0830546	1.068586
L2D.	.4401802	.1964422	2.24	0.028	.0483887	.8319717
L3D.	.1658446	.1524799	1.09	0.280	-.138267	.4699563
L4D.	.3975357	.1054884	3.77	0.000	.1871458	.6079256
_trend	.0001248	.0005246	0.24	0.813	-.0009215	.001171
_cons	.0321093	.0258902	1.24	0.219	-.0195272	.0837457

Graph 2a, 2b, 2c. Shows trends for the variables d_lnGDP, d_lnExport and d_lnImport (1987:1-2007:3)



2a

2b



2c

Table 4. Shows the number of lags for the variables d_lnGDP, d_lnExport and d_lnImport (1987:1-2007:3)

. varsoc d_lngdp

Selection-order criteria
Sample: 1988q2 - 2007q3 Number of obs = 78

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	19.4426				.036488	-.472887	-.460792	-.442673
1	19.5836	.28198	1	0.595	.037301	-.450862	-.426671	-.390433
2	77.7315	116.3	1	0.000	.008617	-1.91619	-1.87991	-1.82555
3	117.412	79.361	1	0.000	.003196	-2.908	-2.85962	-2.78715
4	132.594	30.363*	1	0.000	.002222*	-3.27163*	-3.21116*	-3.12056*

Endogenous: d_lngdp
Exogenous: _cons

. varsoc d_lnexport

Selection-order criteria
Sample: 1988q2 - 2007q3 Number of obs = 78

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	46.4185				.018271	-1.16458	-1.15248	-1.13436
1	46.8999	.96281	1	0.326	.018516	-1.15128	-1.12709	-1.09085
2	78.3036	62.807	1	0.000	.008491	-1.93086	-1.89458	-1.84022
3	94.3403	32.073	1	0.000	.005775	-2.31642	-2.26804	-2.19556
4	103.012	17.343*	1	0.000	.004744*	-2.51312*	-2.45264*	-2.36205*

Endogenous: d_lnexport
Exogenous: _cons

. varsoc d_lnimport

Selection-order criteria
Sample: 1988q2 - 2007q3 Number of obs = 78

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	56.8561				.013981	-1.43221	-1.42011	-1.40199*
1	57.6725	1.6327	1	0.201	.014047	-1.4275	-1.40331	-1.36707
2	57.7025	.0601	1	0.806	.014401	-1.40263	-1.36634	-1.31199
3	61.2029	7.0008	1	0.008	.013507	-1.46674	-1.41836	-1.34589
4	64.3411	6.2764*	1	0.012	.012788*	-1.52157*	-1.46109*	-1.3705

Endogenous: d_lnimport
Exogenous: _cons

Table 5. Shows the results of ADF unit root tests for the variables d_lnGDP, d_lnExport and d_lnImport (1987:1-2007:3)

. dfuller d_lngdp, regress lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 77

Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.108	-3.542	-2.908

Mackinnon approximate p-value for Z(t) = 0.0009

D.d_lngdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d_lngdp					
L1.	-1.65861	.4037773	-4.11	0.000	-2.463719 - .853501
LD.	.369183	.3665886	1.01	0.317	-.3617738 1.10014
L2D.	-.0649786	.2731712	-0.24	0.813	-.6096666 .4797094
L3D.	-.4264248	.1815883	-2.35	0.022	-.7885015 -.0643481
L4D.	.0984703	.1145104	0.86	0.393	-.1298569 .3267976
_cons	.0163387	.0065858	2.48	0.015	.003207 .0294705

```
. dfuller d_lnextport, regress lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 77

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-3.826	-3.542	-2.908	-2.589

Mackinnon approximate p-value for Z(t) = 0.0027

D.d_lnextport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d_lnextport					
L1.	-1.605825	.4197206	-3.83	0.000	-2.442724 - .7689259
LD.	.1935422	.376601	0.51	0.609	-.5573788 .9444632
L2D.	-.2653602	.2830714	-0.94	0.352	-.8297886 .2990682
L3D.	-.5381784	.1871457	-2.88	0.005	-.9113364 -.1650204
L4D.	-.0820433	.1144846	-0.72	0.476	-.3103191 .1462326
_cons	.0369203	.0126609	2.92	0.005	.0116751 .0621655

```
. dfuller d_lnimport, regress lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 77

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-5.663	-3.542	-2.908	-2.589

Mackinnon approximate p-value for Z(t) = 0.0000

D.d_lnimport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d_lnimport					
L1.	-1.541182	.2721694	-5.66	0.000	-2.083873 -.9984917
LD.	.5727769	.2450937	2.34	0.022	.0840739 1.06148
L2D.	.438737	.1950396	2.25	0.028	.0498392 .8276349
L3D.	.1649849	.1514209	1.09	0.280	-.1369398 .4669097
L4D.	.3967305	.1047312	3.79	0.000	.1879025 .6055586
_cons	.0373891	.0132368	2.82	0.006	.0109956 .0637825

Table 6. Shows the number of lags for VAR model (1987:1-2007:3)

```
. varsoc d_lngdp d_lnextport d_lnimport
```

Selection-order criteria
Sample: 1988q2 - 2007q3

Number of obs = 78

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	159.241				3.7e-06	-4.00617	-3.96988	-3.91553
1	187.938	57.394	9	0.000	2.2e-06	-4.51122	-4.36608	-4.14865
2	268.068	160.26	9	0.000	3.6e-07	-6.33507	-6.08107	-5.70057
3	357.89	179.65	9	0.000	4.5e-08	-8.40744	-8.04458*	-7.50102*
4	367.672	19.564*	9	0.021	4.4e-08*	-8.4275*	-7.95578	-7.24914

Endogenous: d_lngdp d_lnextport d_lnimport

Exogenous: _cons

Table 7. VAR estimation results (1987:1-2007:3)

```
. var d_lngdp d_lnexport d_lnimport, lags(4)
```

Vector autoregression

```
Sample: 1988q2 - 2007q3                      No. of obs   =      78
Log likelihood = 327.1082                      AIC          = -8.079697
FPE           = 6.22e-08                      HQIC        = -7.934553
Det(Sigma_ml) = 4.57e-08                      SBIC        = -7.717126
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
d_lngdp	4	.045928	0.9437	1308.201	0.0000
d_lnexport	4	.071043	0.7311	212.0945	0.0000
d_lnimport	4	.110715	0.1466	13.39797	0.0039

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
d_lngdp						
d_lngdp						
L4.	.9371124	.0392433	23.88	0.000	.8601969	1.014028
d_lnexport						
L4.	.0463469	.0587986	0.79	0.431	-.0688964	.1615901
d_lnimport						
L4.	-.185098	.0448538	-4.13	0.000	-.2730099	-.097186
_cons	.0030062	.0052429	0.57	0.566	-.0072697	.0132821
d_lnexport						
d_lngdp						
L4.	.1755492	.0607031	2.89	0.004	.0565733	.2945251
d_lnexport						
L4.	.5877646	.090952	6.46	0.000	.409502	.7660271
d_lnimport						
L4.	.1184123	.0693816	1.71	0.088	-.0175732	.2543978
_cons	.0039292	.0081099	0.48	0.628	-.0119659	.0198244
d_lnimport						
d_lngdp						
L4.	-.0985168	.0946012	-1.04	0.298	-.2839318	.0868982
d_lnexport						
L4.	.2390146	.1417419	1.69	0.092	-.0387943	.5168236
d_lnimport						
L4.	.2649495	.1081261	2.45	0.014	.0530263	.4768728
_cons	.0128326	.0126387	1.02	0.310	-.0119389	.037604

Table 8. Granger Causality Test results (1987:1-2007:3)

```
. vargranger
```

Granger causality wald tests

Equation	Excluded	chi2	df	Prob > chi2
d_lngdp	d_lnexport	.62131	1	0.431
d_lngdp	d_lnimport	17.03	1	0.000
d_lngdp	ALL	17.184	2	0.000
d_lnexport	d_lngdp	8.3633	1	0.004
d_lnexport	d_lnimport	2.9128	1	0.088
d_lnexport	ALL	10.958	2	0.004
d_lnimport	d_lngdp	1.0845	1	0.298
d_lnimport	d_lnexport	2.8435	1	0.092
d_lnimport	ALL	2.9192	2	0.232

Table 9. Testing the VAR model for stability (1987:1-2007:3)

```
. varstable
```

Eigenvalue stability condition

Eigenvalue	Modulus
-.9885279	.988528
4.996e-16 + .9885279 <i>i</i>	.988528
4.996e-16 - .9885279 <i>i</i>	.988528
.9885279	.988528
4.163e-16 + .9096467 <i>i</i>	.909647
4.163e-16 - .9096467 <i>i</i>	.909647
.9096467	.909647
-.9096467	.909647
-1.665e-16 + .6225881 <i>i</i>	.622588
-1.665e-16 - .6225881 <i>i</i>	.622588
.6225881	.622588
-.6225881	.622588

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Table 10. Testing residuals for normality (1987:1-2007:3)

```
. varnorm
```

Jarque-Bera test

Equation	chi2	df	Prob > chi2
d_lngdp	1.250	2	0.53527
d_lnexport	2.075	2	0.35431
d_lnimport	2.620	2	0.26986
ALL	5.945	6	0.42940

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
d_lngdp	-.25178	0.824	1	0.36398
d_lnexport	.14133	0.260	1	0.61034
d_lnimport	-.37995	1.877	1	0.17071
ALL		2.960	3	0.39776

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
d_lngdp	2.638	0.426	1	0.51404
d_lnexport	2.2526	1.815	1	0.17785
d_lnimport	2.5218	0.743	1	0.38869
ALL		2.984	3	0.39404

Table 11. Testing residuals for autocorrelation (1987:1-2007:3)

```
. varlmar, mlag(4)
```

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	15.9782	9	0.06734
2	4.9855	9	0.83557
3	12.8285	9	0.17052
4	30.0970	9	0.00042

H0: no autocorrelation at lag order

Table 12. Johansen Test for cointegration (1987:1-2007:3)

```
. vecrank lngdp lnexport lnimport, lags(3)
```

Johansen tests for cointegration

Trend: constant Number of obs = 80
Sample: 1987q4 - 2007q3 Lags = 3

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	21	272.90207	.	73.6994	29.68
1	26	304.47375	0.54583	10.5560*	15.41
2	29	309.73115	0.12316	0.0412	3.76
3	30	309.75177	0.00052		

Table 13. VEC estimation results (1987:1-2007:3)

```
. vec lngdp lnexport lnimport, lags(3) rank(1)
```

Vector error-correction model

Sample: 1987q4 - 2007q3 No. of obs = 80
Log likelihood = 304.4738 AIC = -6.961844
Det(Sigma_ml) = 9.93e-08 HQIC = -6.651461
SBIC = -6.187685

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_lngdp	8	.057229	0.9182	808.7278	0.0000
D_lnexport	8	.067748	0.7749	247.8812	0.0000
D_lnimport	8	.104001	0.3849	45.05318	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
D_lngdp						
_cel						
L1.	-1.455598	.2216467	-6.57	0.000	-1.890018	-1.021179
lngdp						
LD.	.6209986	.1458958	4.26	0.000	.3350479	.9069492
L2D.	-.0875138	.1178183	-0.74	0.458	-.3184335	.1434059
lnexport						
LD.	-.0032333	.09644	-0.03	0.973	-.1922523	.1857856
L2D.	-.2546249	.094521	-2.69	0.007	-.4398825	-.0693672
lnimport						
LD.	-.1826325	.0843885	-2.16	0.030	-.3480309	-.017234
L2D.	-.2221626	.0640364	-3.47	0.001	-.3476717	-.0966535
_cons	.0244583	.0073908	3.31	0.001	.0099726	.0389441
D_lnexport						
_cel						
L1.	-.3838723	.2623866	-1.46	0.143	-.8981406	.130396
lngdp						
LD.	.534018	.1727124	3.09	0.002	.195508	.8725279
L2D.	-.1500124	.139474	-1.08	0.282	-.4233765	.1233517
lnexport						
LD.	-.4157395	.1141662	-3.64	0.000	-.6395012	-.1919777
L2D.	-.2981946	.1118945	-2.66	0.008	-.5175037	-.0788855
lnimport						
LD.	-.0219145	.0998996	-0.22	0.826	-.2177142	.1738852
L2D.	.0074972	.0758067	0.10	0.921	-.1410812	.1560755
_cons	.0393042	.0087493	4.49	0.000	.0221559	.0564525
D_lnimport						
_cel						
L1.	1.402991	.4027948	3.48	0.000	.613528	2.192455
lngdp						
LD.	-.4787716	.2651341	-1.81	0.071	-.9984249	.0408817
L2D.	-.616435	.2141093	-2.88	0.004	-1.036082	-.1967885
lnexport						
LD.	-.4204231	.1752588	-2.40	0.016	-.7639241	-.0769221
L2D.	-.2472499	.1717714	-1.44	0.150	-.5839156	.0894157
lnimport						
LD.	.2519099	.1533579	1.64	0.100	-.0486659	.5524858
L2D.	.1766596	.1163723	1.52	0.129	-.0514259	.4047452
_cons	.0361294	.0134312	2.69	0.007	.0098048	.0624541

Cointegrating equations

Equation	Parms	chi2	P>chi2
_cel	2	4999.473	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_cel						
lngdp	1					
lnexport	-.0054452	.0237691	-0.23	0.819	-.0520318	.0411414
lnimport	-.3864694	.024645	-15.68	0.000	-.4347728	-.3381661
_cons	-10.85627

Table 14. Testing residuals for normality (1987:1-2007:3)

. vecnorm

Jarque-Bera test

Equation	chi2	df	Prob > chi2
D_lngdp	0.939	2	0.62533
D_lnexport	0.317	2	0.85336
D_lnimport	5.590	2	0.06111
ALL	6.846	6	0.33529

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
D_lngdp	-.14896	0.296	1	0.58650
D_lnexport	.04292	0.025	1	0.87546
D_lnimport	-.3202	1.367	1	0.24232
ALL		1.687	3	0.63973

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
D_lngdp	2.5608	0.643	1	0.42259
D_lnexport	3.2963	0.293	1	0.58857
D_lnimport	4.1256	4.223	1	0.03987
ALL		5.159	3	0.16052

Table 15. Testing residuals for autocorrelation (1987:1-2007:3)

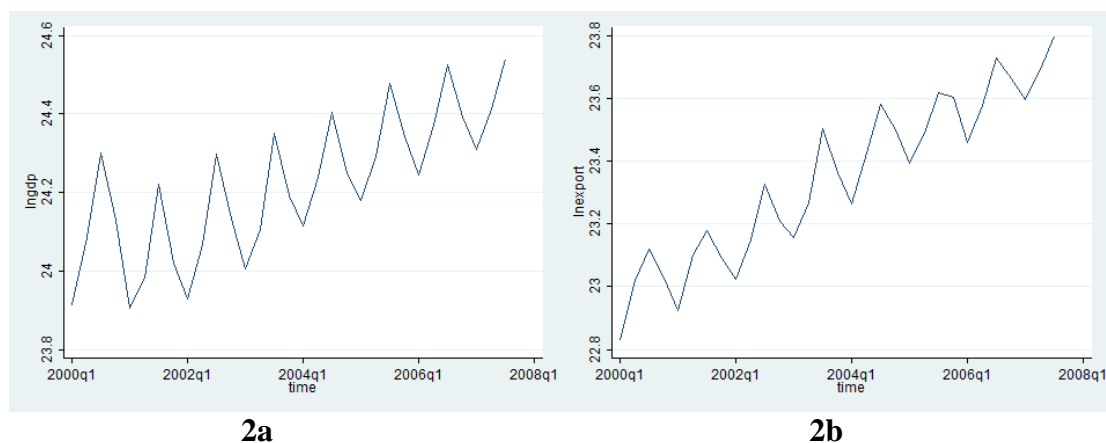
. vec1mar, mlag(3)

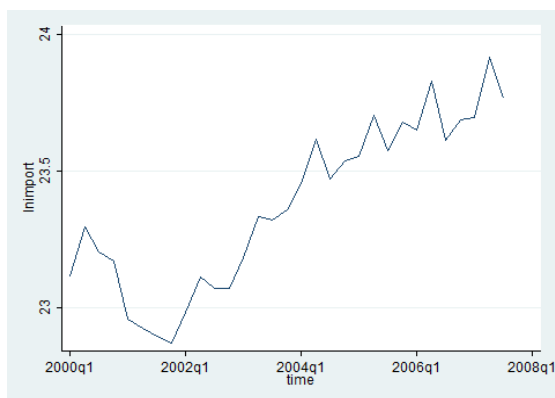
Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	71.1745	9	0.00000
2	64.9122	9	0.00000
3	7.1218	9	0.62444

H0: no autocorrelation at lag order

Graph 2a, 2b, 2c. Shows trends for the variables lnGDP, lnExport and lnImport (2000:1-2007:3)





2c

Table 16. Shows the number of lags for the variables lnGDP, lnExport and lnImport (2000:1-2007:3)

. varsoc lngdp

Selection-order criteria
Sample: 2001q1 - 2007q3
Number of obs = 27

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	8.89836				.032617	-.585064	-.570793	-.53707
1	15.0509	12.305	1	0.000	.022274	-.966732	-.93819	-.870744
2	15.7624	1.423	1	0.233	.02277	-.945363	-.90255	-.801381
3	31.9752	32.426	1	0.000	.007388	-2.07224	-2.01515	-1.88026
4	42.3537	20.757*	1	0.000	.003696*	-2.76694*	-2.69558*	-2.52697*

Endogenous: lngdp
Exogenous: _cons

. varsoc lnexport

Selection-order criteria
Sample: 2001q1 - 2007q3
Number of obs = 27

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	1.14666				.057919	-.010863	.003408	.037131
1	19.9485	37.604	1	0.000	.015497	-1.32952	-1.30098	-1.23353
2	19.9934	.08977	1	0.764	.016644	-1.25877	-1.21596	-1.11479
3	42.2898	44.593	1	0.000	.003441	-2.83628	-2.77919	-2.6443
4	53.7196	22.86*	1	0.000	.001593*	-3.60886*	-3.53751*	-3.36889*

Endogenous: lnexport
Exogenous: _cons

. varsoc lnimport

Selection-order criteria
Sample: 2001q1 - 2007q3
Number of obs = 27

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-6.96541				.10563	.59003	.604301	.638024
1	19.8644	53.66	1	0.000	.015594	-1.32329	-1.29474	-1.2273*
2	21.1179	2.5071	1	0.113	.015313	-1.34207	-1.29925	-1.19809
3	21.7004	1.165	1	0.280	.015815	-1.31114	-1.25406	-1.11917
4	23.6341	3.8673*	1	0.049	.014789*	-1.3803*	-1.30895*	-1.14033

Endogenous: lnimport
Exogenous: _cons

Table 17. Shows the results of ADF unit root tests for the variables lnGDP, lnExport and lnImport (2000:1-2007:3)

. dfuller lngdp, trend regress lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 26

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-5.372	-4.371	-3.596	-3.238

Mackinnon approximate p-value for Z(t) = 0.0000

D.lngdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnngdp						
L1.	-1.236139	.230094	-5.37	0.000	-1.717731	-.7545465
LD.	.3761032	.1653399	2.27	0.035	.0300428	.7221637
L2D.	.0701201	.1313631	0.53	0.600	-.204826	.3450662
L3D.	-.1863896	.1089261	-1.71	0.103	-.4143745	.0415954
L4D.	.4228926	.1162846	3.64	0.002	.179506	.6662791
_trend	.0208551	.0039085	5.34	0.000	.0126746	.0290356
_cons	29.58926	5.505835	5.37	0.000	18.06541	41.1131

. dfuller lnexport, trend regress lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 26

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-1.152	-4.371	-3.596	-3.238

Mackinnon approximate p-value for Z(t) = 0.9199

D.lnexport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnexport						
L1.	-.4731	.4106353	-1.15	0.264	-1.33257	.3863695
LD.	-.2922919	.4089175	-0.71	0.483	-1.148166	.5635822
L2D.	-.5915163	.335024	-1.77	0.094	-1.29273	.1096969
L3D.	-.5074699	.2573623	-1.97	0.063	-1.046135	.0311956
L4D.	.106493	.2202193	0.48	0.634	-.3544313	.5674173
_trend	.0125845	.0111933	1.12	0.275	-.0108434	.0360124
_cons	10.90165	9.386574	1.16	0.260	-8.74467	30.54798

. dfuller lnimport, regress lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 26

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-1.014	-3.743	-2.997	-2.629

Mackinnon approximate p-value for Z(t) = 0.7483

D.lnimport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnimport						
L1.	-.0652768	.0644019	-1.01	0.323	-.1996167	.0690632
LD.	-.0318902	.1879052	-0.17	0.867	-.4238535	.3600731
L2D.	.0581468	.1762301	0.33	0.745	-.3094628	.4257563
L3D.	-.141124	.1758595	-0.80	0.432	-.5079604	.2257125
L4D.	.5647761	.1767015	3.20	0.005	.1961833	.9333689
_cons	1.548756	1.501645	1.03	0.315	-1.583621	4.681133

Graph 3a, 3b, 3c. Shows trends for the variables d_lnGDP, d_lnExport and d_lnImport (2000:1-2007:3)

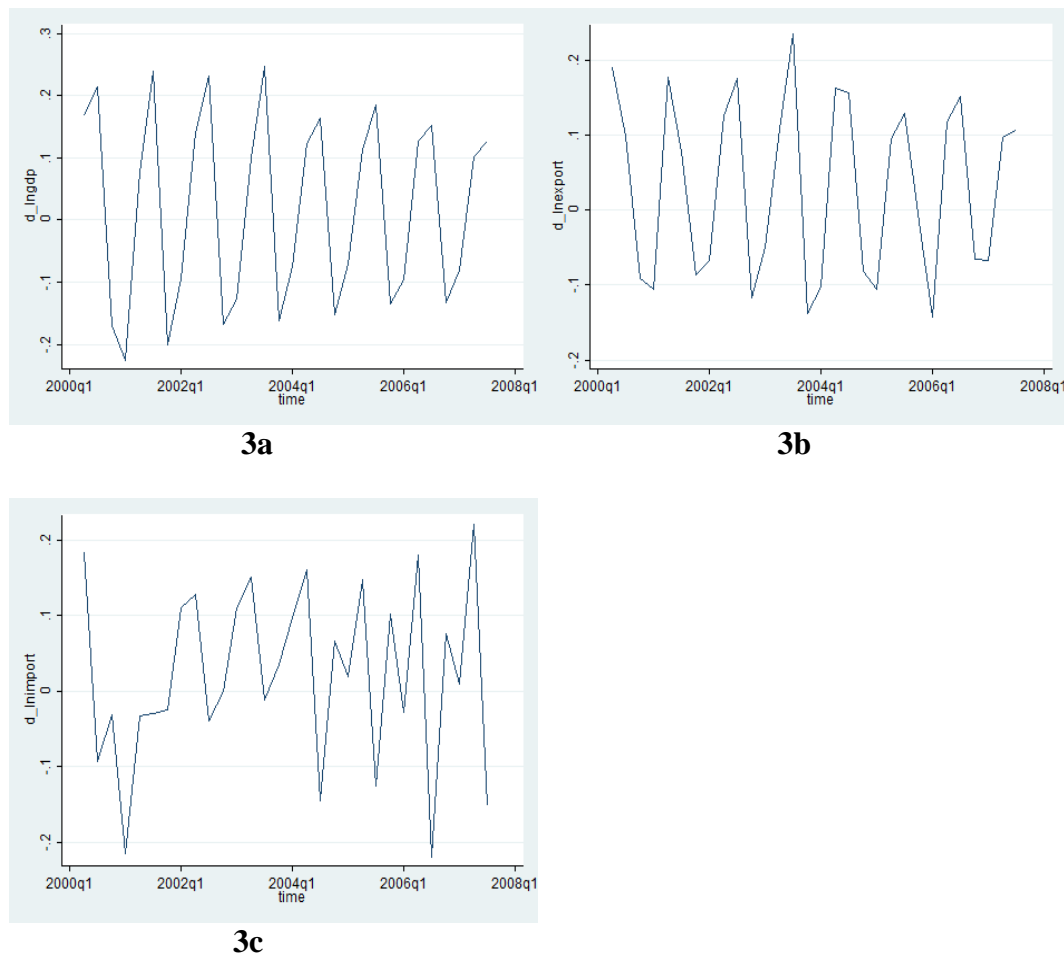


Table 18. Shows the number of lags for the variables d_lnGDP, d_lnExport and d_lnImport (2000:1-2007:3)

. varsoc d_lngdp

Selection-order criteria
Sample: 2001q2 - 2007q3

Number of obs = 26

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	13.1804				.022942	-.936957	-.923023	-.888569
1	13.2757	.1905	1	0.662	.024602	-.867361	-.839493	-.770584
2	30.9936	35.436	1	0.000	.006804	-2.15335	-2.11155	-2.00819
3	40.65	19.313	1	0.000	.003501	-2.81923	-2.76349	-2.62568
4	49.0263	16.753*	1	0.000	.00199*	-3.38664*	-3.31697*	-3.1447*

Endogenous: d_lngdp
Exogenous: _cons

. varsoc d_lnexport

Selection-order criteria
Sample: 2001q2 - 2007q3

Number of obs = 26

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	18.7008				.015004	-1.3616	-1.34766	-1.31321
1	18.7442	.08674	1	0.768	.016154	-1.28801	-1.26014	-1.19124
2	41.3404	45.192	1	0.000	.00307	-2.94926	-2.90746	-2.8041
3	51.6474	20.614*	1	0.000	.001503*	-3.66518*	-3.60945*	-3.47163*
4	51.671	.04721	1	0.828	.001624	-3.59008	-3.52041	-3.34814

Endogenous: d_lnexport
Exogenous: _cons

. varsoc d_lnimport

Selection-order criteria
Sample: 2001q2 - 2007q3

Number of obs = 26

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	20.5896				.012975	-1.50689	-1.49296	-1.4585
1	22.8489	4.5187	1	0.034	.01178	-1.60376	-1.5759	-1.50699
2	22.9766	.25529	1	0.613	.012607	-1.53666	-1.49486	-1.3915
3	24.1739	2.3946	1	0.122	.012435	-1.55184	-1.4961	-1.35828
4	28.9266	9.5054*	1	0.002	.009339*	-1.84051*	-1.77084*	-1.59857*

Endogenous: d_lnimport

Exogenous: _cons

Table 19. Shows the results of ADF unit root tests for the variables d_lnGDP, d_lnExport and d_lnImport (2000:1-2007:3)

. dfuller d_lngdp, regress lags(4)

Augmented Dickey-Fuller test for unit root Number of obs = 25

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
z(t)	-3.118	-3.750	-3.000	-2.630

Mackinnon approximate p-value for z(t) = 0.0253

D.d_lngdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
d_lngdp						
L1.	-1.553642	.4982961	-3.12	0.006	-2.596588	-.5106963
LD.	.2242579	.4564997	0.49	0.629	-.7312069	1.179723
L2D.	-.1580015	.3456311	-0.46	0.653	-.8814157	.5654126
L3D.	-.4811882	.2389609	-2.01	0.058	-.981339	.0189627
L4D.	.0712793	.170021	0.42	0.680	-.2845787	.4271373
_cons	.0245055	.0090748	2.70	0.014	.0055118	.0434992

. dfuller d_lnexport, regress lags(3)

Augmented Dickey-Fuller test for unit root Number of obs = 26

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
z(t)	-4.059	-3.743	-2.997	-2.629

Mackinnon approximate p-value for z(t) = 0.0011

D.d_lnexport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
d_lnexport						
L1.	-3.212693	.7914293	-4.06	0.001	-4.85856	-1.566826
LD.	1.520328	.5950616	2.55	0.018	.2828296	2.757826
L2D.	.6317901	.394766	1.60	0.124	-.1891708	1.452751
L3D.	-.0410194	.2099649	-0.20	0.847	-.4776654	.3956266
_cons	.0828899	.0216245	3.83	0.001	.0379193	.1278604

```
. dfuller d_lnimport, regress lags(4)
```

Augmented Dickey-Fuller test for unit root Number of obs = 25

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-3.501	-3.750	-3.000	-2.630

Mackinnon approximate p-value for Z(t) = 0.0080

D.d_lnimport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
d_lnimport					
L1.	-1.225895	.3501749	-3.50	0.002	-1.95882 -1.4929708
L2.	.0829251	.3251117	0.26	0.801	-.5975414 .7633917
L3.	-.0693763	.2692228	-0.26	0.799	-.6328662 .4941135
L4.	-.3014561	.2251941	-1.34	0.196	-.7727929 .1698806
L5.	.2774018	.1730632	1.60	0.125	-.0848237 .6396274
_cons	.0474594	.0167138	2.84	0.010	.012477 .0824417

Table 20. Shows the number of lags for VAR model (2000:1-2007:3)

```
. varsoc d_lngdp d_lnexport d_lnimport
```

Selection-order criteria

Sample: 2001q2 - 2007q3

Number of obs = 26

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	77.2174				6.7e-07	-5.70903	-5.66723	-5.56387
1	95.0414	35.648	9	0.000	3.4e-07	-6.3878	-6.22059	-5.80714
2	129.712	69.341	9	0.000	4.9e-08	-8.36244	-8.06983	-7.34629
3	169.642	79.86	9	0.000	4.9e-09*	-10.7417	-10.3237*	-9.29004*
4	179.127	18.97*	9	0.025	5.6e-09	-10.779*	-10.2356	-8.89184

Endogenous: d_lngdp d_lnexport d_lnimport

Exogenous: _cons

Table 21. VAR estimation results (2000:1-2007:3)

```
. var d_lngdp d_lnexport d_lnimport, lags(4)
```

Vector autoregression

Sample: 2001q2 - 2007q3

Log likelihood = 140.3663

FPE = 1.04e-08

Det(Sigma_m1) = 4.11e-09

No. of obs = 26

AIC = -9.874329

HQIC = -9.70712

SBIC = -9.293669

Equation	Parms	RMSE	R-sq	chi2	P>chi2
d_lngdp	4	.03919	0.9388	398.98	0.0000
d_lnexport	4	.042419	0.8904	211.2341	0.0000
d_lnimport	4	.082266	0.5233	28.54638	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
d_lngdp					
d_lngdp					
L4.	.8116786	.1091648	7.44	0.000	.5977196 1.025638
d_lnexport					
L4.	.095846	.1406479	0.68	0.496	-.1798188 .3715108
d_lnimport					
L4.	-.1419096	.0622832	-2.28	0.023	-.2639825 -.0198367
_cons	.0047751	.0076318	0.63	0.532	-.0101831 .0197332
d_lnexport					
d_lngdp					
L4.	.3383877	.1181594	2.86	0.004	.1067995 .5699759
d_lnexport					
L4.	.4855168	.1522366	3.19	0.001	.1871385 .7838951
d_lnimport					
L4.	-.0094388	.0674151	-0.14	0.889	-.1415699 .1226923
_cons	.0092337	.0082607	1.12	0.264	-.0069569 .0254244
d_lnimport					
d_lngdp					
L4.	-.4174351	.229152	-1.82	0.069	-.8665648 .0316946
d_lnexport					
L4.	.313096	.2952395	1.06	0.289	-.2655628 .8917548
d_lnimport					
L4.	.6021432	.1307412	4.61	0.000	.3458952 .8583912
_cons	.0185531	.0160203	1.16	0.247	-.0128461 .0499524

Table 22. Granger Causality Test results (2000:1-2007:3)

```
. vargranger
```

Granger causality wald tests

Equation	Excluded	chi2	df	Prob > chi2
d_lngdp	d_lnexport	.46439	1	0.496
d_lngdp	d_lnimport	5.1914	1	0.023
d_lngdp	ALL	5.3847	2	0.068
d_lnexport	d_lngdp	8.2015	1	0.004
d_lnexport	d_lnimport	.0196	1	0.889
d_lnexport	ALL	8.4054	2	0.015
d_lnimport	d_lngdp	3.3184	1	0.069
d_lnimport	d_lnexport	1.1246	1	0.289
d_lnimport	ALL	5.5103	2	0.064

Table 23. Testing the VAR model for stability (2000:1-2007:3)

```
. varstable
```

Eigenvalue stability condition

Eigenvalue	Modulus
.9891221	.989122
-.9891221	.989122
2.498e-16 + .9891221i	.989122
2.498e-16 - .9891221i	.989122
-.902731	.902731
-2.845e-16 + .902731i	.902731
-2.845e-16 - .902731i	.902731
.902731	.902731
-.7261543	.726154
.7261543	.726154
1.943e-16 + .7261543i	.726154
1.943e-16 - .7261543i	.726154

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Table 24. Testing residuals for normality (2000:1-2007:3)

```
. varnorm
```

Jarque-Bera test

Equation	chi2	df	Prob > chi2
d_lngdp	0.930	2	0.62821
d_lnexport	1.060	2	0.58860
d_lnimport	0.447	2	0.79981
ALL	2.437	6	0.87550

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
d_lngdp	-.14253	0.088	1	0.76670
d_lnexport	-.11731	0.060	1	0.80708
d_lnimport	.17639	0.135	1	0.71348
ALL		0.282	3	0.96329

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
d_lngdp	2.1185	0.842	1	0.35890
d_lnexport	2.0391	1.000	1	0.31722
d_lnimport	2.4634	0.312	1	0.57649
ALL		2.154	3	0.54106

Table 25. Testing residuals for autocorrelation (2000:1-2007:3)

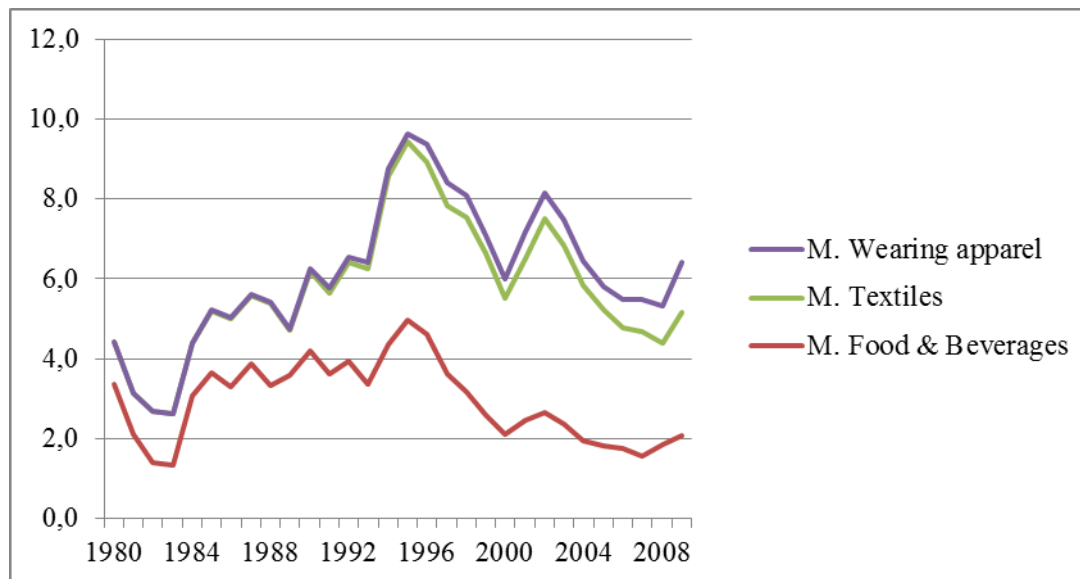
. varlmar, mlag(4)

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	9.2475	9	0.41475
2	4.4388	9	0.88023
3	9.4215	9	0.39931
4	12.4714	9	0.18802

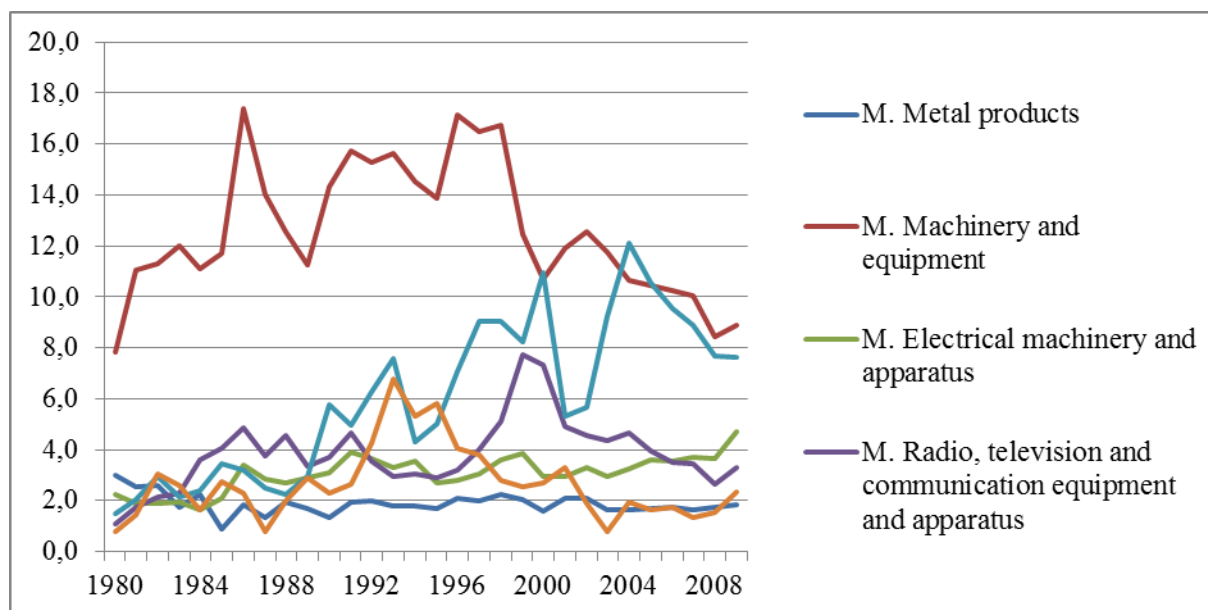
H0: no autocorrelation at lag order

Graph 4. Shows import trend of low value-added product groups



Source: Turkstat

Graph 5. Shows import trend of high value-added product groups



Source: Turkstat