Trade-Growth Nexus: Turkish Case

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Abstract. The aim of this study is to investigate the role of international trade on the economic growth of Turkish economy for the period of 1998-2010. Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests indicate that the variables of the study are stationary in their first differences. Granger causality and cointegration techniques were employed to test the direction of causality between gross domestic product, exports and imports. The results suggest that there is bidirectional causality relationship between imports and gross domestic product and one-way causality relationship from gross domestic product to exports. Furthermore, the results also reveal the existence of a one one-way causality relationship from imports to exports. As a conclusion, the findings support "import-led growth" and "growth-driven export" hypotheses for Turkish economy.

 Keywords: export, import, economic growth, cointegration, Granger causality, Turkey

1   Introduction

The role of international trade on economic growth is one of the fundamental questions in economic literature. Although the direction and magnitude of the effects of trade are still controversial, the literature usually suggests that open economies benefit from integration with their trade partners (Alici & Ucal (2003); Lee et al., 2004). Trade assists positively to economic growth by facilitating the exploitation of economies of scale; enhancing effectiveness through increased competition and encouraging the diffusion of knowledge. Trade also can help a country to integrate into the world economy and help to reduce the impact of external shocks on the domestic economy. Despite this strong theoretical basis, the link and causation between trade and economic growth still remains a subject of debate. There are some studies that show that there is no causal relationship between trade openness and economic growth, for example Abhayaratne (1996) and Narayan & Smyth (2005). Some other studies have found bidirectional causality between trade and growth such as Giles & Williams (2000) and Doyle (2001).

Over the last three decades, there have been significant changes in the economic history of Turkey. In 1980, Turkish economy adopted a growth strategy directed at export (Azgun, 2011). Since then, integrating Turkish economy into the world markets and promoting exports have been the main stimulus behind the economic policies for all governments. These export-oriented policies succeeded in raising exports considerably. Exports rose from a value of 2, 9 billion dollars in 1980 to 132 billion dollars in 2008. Despite the fact that the trade has grown rapidly in Turkey, researchers have not paid enough attention to the contribution of trade to the Turkish economy. Although empirical studies to date by and large support the hypothesis that trade leads to economic growth, the conclusions still remain a subject of debate (Konya, 2004; Love & Chandra, 2004). The objective of this study is to re-examine trade and economic growth nexus in Turkey. The time series techniques were employed to investigate the cointegration and causality relationship between trade and economic growth for the period of 1998:Q1-2010:Q3.

The paper is organized as follows. Section 2 provides an overview of the existing literature; section 3 highlights the methodology employed, section 4 discusses the results obtained from the study and section 5 provides concluding remarks.

2   Related Work

Over the past decades, the relationship between trade and economic growth has been one of the major debates of economic research in the academia. The question is whether trade proceeds or follows economic growth unless there is a complementary relationship between them. The majority of trade growth studies has been focusing on the popular Export-led Growth (ELG) hypothesis which claims that only exports are significant for sustainable economic growth (Thornton, 1996; Bahmani-Oskooee & Niroomand 1999; Giles & Williams, 2000; Tsen, 2006; Salem, 2010). Exports can contribute to economic growth both directly as an aggregate output and indirectly through greater capital utilization, exploitation of economies of scale and technical improvements due to the increased competition. In addition, the increase in the volume of hard currency income generated by exports allows the import of capital and intermediate goods for domestic production. Despite the popularity of the ELG hypothesis, some empirical studies cast doubt on the validity of the ELG hypothesis (Kugler, 1991; Alam, 2003, Love & Chandra, 2005).

Others, as Oxley (1993), Pomponio (1996), Tuncer (2002), Reppas & Christopoulos (2005) argue for a reverse causation running from output to exports which is known as "Growth-Driven Export" hypothesis. It is generally based on the idea that innovation and technology advancement generated from growth will improve export growth in the trade sector (e.g., Bhagwati, 1988; Greenaway & Sapsford, 1994). Besides these two approaches, there exists a possibility of a feedback relationship between exports and economic growth (e.g., Ramos, 2001). Ghartey (1993), Dutt & Ghosh (1996), argue that a feedback effect could exist through the so-called "threshold effect". Another group of studies sometimes referred to as Import-led Growth (ILG) hypothesis highlights the contribution of imports to economic growth. According to Riezman et al. (1995) omitting imports may be misleading. Coe & Helpman (1995) shows that imports spur productivity by enhancing R&D spillovers among nations. Lawrence & Weinstein (1999) argue that imports have been supportive for total factor productivity in Japan, Korea and the United States. Contrarily, Serletis (1992) fails to indicate a causal relationship from imports to output growth.

The results of empirical studies based on testing causality between trade and growth for Turkey is mixed, that is, some researchers reported results supporting ELG hypothesis while others reported no significant relationship between export and economic growth. Ozmen et al (1999), Alici & Ucal (2003), Karagoz & Sen (2005), Halicioglu (2007) found that export-led growth hypothesis is valid for Turkey. Yigidim & Kose (1997), Tuncer (2002), Saatcioglu & Karaca (2004) and Takim (2010) on the contrarily found a reverse causation running from output to exports in Turkey. Cetintas (2004) detected a bilateral causation between exports and economic growth. Cil (2004) found no causal relationship between exports and economic growth while Ugur (2008) and Azgun & Sevinc (2010) detected a bilateral causation between imports and economic growth.

3   Materials and Methods

3.1   Source of Data

The data used in this paper are quarterly figures covering the period 1998:Q1-2010:Q3 and variables of the study are export (EXP), import (IMP) and real gross domestic product (GDP). All data are taken from Turkish Statistical Institute (Turkstat). First, the series were seasonally adjusted. Then, the stationarity of each series was tested using the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1981) and Phillips-Perron (PP) test (Phillips & Perron, 1988) in order to avoid any spurious regression.

3.2   Estimation Technique

The study employs a three step procedure to test the causality relationship between trade and economic growth. First the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used

to check whether the variables are stationary at same level or not. The ADF tests were calculated for the GDP, EXP and IMP series including intercept and trend in the underlying Dickey-Fuller regressions. In the presence of a structural break in a stationary series, ADF test may reject the null of a unit root process where in fact it is stationary. Therefore, Phillips-Perron test was also used in the analysis. Secondly, the cointegration analysis developed by Johansen (1988) and Johansen & Juselius (1990) was implemented to investigate long term relationship between trade and growth. Finally, Granger causality tests were conducted to determine whether the current and lagged values of a variable affect another.

3   Results and Discussions

3.1   Unit Root Test Results

The prerequisite for series to be cointegrated is that they should be integrated in the same order. A variable is said to be integrated of order d, if it needs differencing d time to achieve stationarity. Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are calculated for individual series to provide evidence as to whether the variables are integrated. The results of both the ADF and PP tests are reported in Table 1. The results in Table 1 show that the null hypothesis of unit root cannot be rejected in levels but it is rejected in their first differences indicating that the variables considered are integrated of the same order I (1).

Table 1:   ADF and PP Unit Root Test Results

Variables	ADF Intercept	ADF (Intercept and Trend)	PP Intercept	PP (Intercept and Trend)
Level				
GDP	-0,149	-2,336	-0,260	-2,208
EXP	-0,579	-2,161	-0,671	-2,298
IMP	-0,736	-3,670	-0,609	-2,064
First Differences				
GDP	-5,346*	-5281*	-5,345*	-5,282*
EXP	-6,030*	-5,961*	-5,963*	-5,885*
IMP	-4,713*	-4,669*	-3,188**	-3,134***

* , ** and *** denotes rejection of the null hypothesis of unit roots for the tests at the 1%, 5% and 10% significance levels.

3.2   Cointegration Test Results

The existence of cointegration implies that there is long-run equilibrium relationship between these variables. Having confirmed of the stationarity of variables at I (1), the multivariate Vector Autoregression (VAR) approach developed by Johansen (1998) and Johansen & Juselius (1990) was employed to examine whether there is a long run relationship among EXP, IMP and GDP series. The results of both the cointegration tests are reported in Table 2 and Table 3.

Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.467912	42.08816*	29.79707	0.0012
At most 1	0.201552	11.17179	15.49471	0.2012
At most 2	0.002907	0.142628	3.841466	0.7057

* denotes rejection of the hypothesis at the 0.05 level,
**MacKinnon-Haug-Michelis (1999) *p*-values

Table 3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**

None	0.467912	30.91637*	21.13162	0.0015
At most 1	0.201552	11.02916	14.26460	0.1528
At most 2	0.002907	0.142628	3.841466	0.7057

* denotes rejection of the hypothesis at the 0.05 level,
**MacKinnon-Haug-Michelis (1999) *p*-values

Taken the results provided by the trace and maximum eigen value tests together it can be concluded that there is only one cointegrating relationship among the three variables subject to empirical analysis. The null hypothesis of no cointegration can be rejected either using the maximum Eigenvalue or trace statistic. They are both greater than their critical values suggesting that there is only one cointegrating vector. Therefore, the data appear to support the proposition that export, import and economic growth has long run relationship. Long run cointegrating relationship is shown in Table 4.

Table 4: Estimates of long-run Cointegrating Relationship

Dependent variable	EXP	IMP
GDP	0.342926	-0.478135
	(0.10915)	(0.07175)

Note: Figures in parentheses indicate the standard errors of coefficients

3.3   Granger Test Results

Since there is cointegration between the variables, causality test was carried out to determine the direction of relationship. The Granger causality tests reported in Table 5 show that causality has been found in four out of six cases. The test results show that the economic growth of Turkish economy is driven by imports since there is a causality relationship running from imports to GDP. There is bidirectional causality relationship between imports and gross domestic product and one-way causality link from gross domestic product to exports. Furthermore, the results also indicate one-way causality running from imports to exports.

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Table 5: Granger Causality Test Results

Null Hypothesis	F-Statistic	Probability
IMP does not Granger Cause EXP	11.030*	0.040
EXP does not Granger Cause IMP	2.131	0.344
GDP does not Granger Cause IMP	10.706*	0.047
IMP does not Granger Cause GDP	10.449*	0.054
EXP does not Granger Cause GDP	8.887	0.118
GDP does not Granger Cause EXP	16.641*	0.002

*Indicates rejection of the null hypothesis.

4   Conclusion

The purpose of this paper was to examine the causality between trade and output and to test the direction of causality among these variables using Turkish data over the period of 1998:Q1-2010:Q3. Cointegration and Granger causality tests were employed in the empirical analysis. Prior to cointegration test, Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) tests were used to check the stationarity of the variables. The variables proved to be integrated at their first differences I (1). Johansen and Juselius cointegration test was used to determine the presence of a cointegrating vector in the variables. Both trade and eigenvalue results indicated that there is only one cointegrating vector among export, import and output at 5% level of significance.

In addition, Granger causality analysis was carried out to test the causality among exports, imports and GDP. The results show that there is a feedback relationship between imports and GDP, that is, economic growth causes import growth and *vice versa*. In addition, causality test results indicate the presence of one-way causality from GDP to exports. The results also show that there is unidirectional

causality running from imports to exports. This finding seems reasonable since most of the Turkish imports are intermediate goods for production and investment goods rather than consumption goods. As a result, this study supports "import-led growth" and "growth-driven exports" hypotheses for Turkish economy. Imports contribute positively to economic growth in Turkey although the country suffers from a chronic trade balance deficit. This trade deficit problem together with the dependence of growth on imports raises serious questions about the sustainability of economic growth in coming years.

5   References

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