Causal Links Between Trade And Economic Growth Evidence From Turkey And European Union Countries

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ABSTRACT

Openness and economic growth is discussed by heavy concentration on the deterministic relationship running from trade flows to economic growth. While traditional motive of export promotion based growth strategies is heavily discussed, it is the modern growth theories that define possible alternative mechanisms. Technology transfer, place of innovation and spillovers are at the center of the debate. However it is the more contemporary studies that also underline the possible reverse relationship. Originating from such a discussion the study aims to search for the causal relationship by working on a new European Union candidate country, Turkey. Results point out that short term dynamics illustrates a two way relationship.

INTRODUCTION

Trade openness and economic growth is one of the major debates of the modern growth theories. While trade liberalization and policy implications stand at the center of the debate, the contemporary consequences of the trade liberalization also gain importance. With increasing liberalization in the globe, discussions regarding the significance of export and import flows for countries attract more importance. While in the traditional sense export promotion is attributed as a vital mechanism for economic growth, other potentials coming from import volumes is also underlined. However the interconnection between trade flows and economic growth from a causal perspective is not evaluated in details.

While Heckscher-Ohlin type of understanding regarding the comparative advantage of nations is a fact of the international trade, modern growth theories remark the complementary effects of export and import volumes. Other than the traditional abundance argument of previous models, recent studies underline that knowledge and technology transfer is an important part of the international trade process. In the scope of such an understanding comments of Rivera-Batiz, Romer (1991) and Grossman, Helpman (1994) are vital. Positive and inevitable impacts of openness and international trade volumes are endogonized within the economic growth theory. However while early evidence validates the positive effect of openness on economic growth, it is the rise of time series evidences that underline a possible reverse mechanism. Actually interaction of the economic growth and international trade discussion gives rise to the evolution of four major channels; (i) Export led Growth, (i) Import led Growth, (iii) Growth led exports, (iv) Growth led imports.

Originating from such a discussion the major objective of the study is twofold. First of all the Euro area will be assessed based on the general relationship between economic growth and international trade, without making a causal understanding. Next Turkey as a candidate country to the union will be placed within the developed nations and transition countries of the region. Finally the study aims to make a quantitative assessment of the discussed relationship between economic growth and international trade flows. Vector auto regressive (VAR) type models will

be constructed. While doing this, possible cointegrating behavior will also be assessed and based on the detection of cointegration an augmented type of vector error correction (VEC) models will be preferred. Result are expected to open up a discussion for a newly EU candidate country.

The paper will continue as follows; following section aims to define and discuss the possible mechanism that may prevail between economic growth and international trade flows. Moreover the general environment in the Euro area will be illustrated. Following the general understanding, VAR and VEC models will be introduced and model selection, testing criterions will be assessed. The paper will next illustrate the empirical findings and finally will end with a conclusion.

OPENNESS AND ECONOMIC GROWTH

Comparative advantage approach that stood at the hearth of traditional trade theories, facilities from the capital and labor abundances of nations. While major gains from trade can be attributed to the inevitable productivity gains at the national base, actual mechanisms needs a wider understanding. Although comparative advantage and specialization are both crucial elements to understand the possible gains from increasing integration, it is the contributions of modern growth models that try to connect trade and growth by introducing alternative mechanisms.

Rivera-Batiz, Romer (1991) and Grossman, Helpman (1994) underline the unavoidable positive impact of economic integration and increasing trade volumes as an integral part of the economic growth. The background is that trade stimulates not only the exchange of goods but also the exchange of ideas, thus knowledge. Within such an understanding export led and import led growth approaches gain importance. Export led growth approach underlines the efficient allocation of resources and increased technological advances coming from foreign market interaction and also competition (Balassa, 1978 and Helpman, Krugman, 1995). On the other hand import led growth theories emphasize that import acceleration may help the domestic production for obtaining the required foreign intermediate goods. Moreover in this understanding the role of technology is also vital. Actually imports stands as an important channel for technology and knowledge transfer. It is the R&D spillovers that stand at the center of the positive impact of imports within the endogenous growth models (Coe, Helpman, 1995). At the end, both export and import led views point out the positive side of increasing integration and trade for the economic growth concerns within the context of endogenous growth literature.

Similar to most of the economic growth theories, trade theories also suffer from the endogeneity problem. While the traditional discussion as introduced above underlines the positive role of trade stimulation for economic growth, other approaches also exist. One is in favor of a reverse mechanism, second is to underline the possible bi-directional relationship. Finally the absence of an interrelationship between trade and economic growth is also a possibility. The growth led trade case is discussed by Bhagwati (1988); economic growth that affects domestic productivity, technological advances and the general skill level of the labor force may alter the export potential of countries. Moreover increasing growth and general development level of economies can motivate the import potential and desire of the economy. Such cases will prepare the formation of a different channel that gives a specific role to economic growth to alter the exports and imports of the economies. In line with the expectations the remaining views in favor of bi-directional relationship and the absence of a significant link is an empirical matter of fact. Following the discussion, while Awokuse (2006) points out the positive role of trade on economic growth for a set of transition economies, Liu et al (1997) highlights the possibility of a reverse mechanism for China. Meanwhile Dritsaki et al. (2004) remarks the bi-directional relationship between export volume and economic growth for the case of Greece. Hussain et al. (2008) also constructs a similar question for the case of Pakistan from a different perspective and try to investigate the causal link between export stimulation and agricultural GDP; findings underline that while a long run bi-directional relationship exits between exports and agricultural GDP, short term dynamics are found to be at unclear.

While origins of the study constructs an environment in which direction of a relationship can be constructed by using different models, identifying the general area of study seems to be an important factor in the

process. Within the central idea of the study, Turkey as a candidate to EU can be placed inside the core and new members of the union. Figures one and two illustrate the relationship between export and import relative volumes with per capita income levels. There seems to be a clear cut between the advanced core countries of the union and the new members, transition economies of the region. In this setting one can approach to the figures from a matrix perspective and divide the picture in four major groups. Countries may be labeled as high per capita income with low or high trade volumes ones. Similarly countries can be defined as ones with low per capita income with low of high trade volumes. In such a setting figures can be approached by dividing nations below and above the average per capita income levels of the Euro area. Such an illustration underlines the interesting place of Turkey within the region. While Turkey belongs to a block of countries with identical income levels, it seems to be lagging in terms of trade realizations. Note that Turkey belongs to a group of countries with per capita income level below the Euro average. Moreover when the average growth rate of imports and exports are computed for 1996-2006 period, figures indicate that countries that lie below the line realizes an average annual growth rate for exports and imports of 10.73% and 11.75% respectively. This indicates the trade potential of the countries and the significance of their investigation in such a setting. In the knowledge of the ongoing study few studies are done for this group of countries. As indicated above Awokuse (2006) work on three transition economies, new members of the EU. Results for Poland, Czech Republic and Bulgaria underline that country based studies validate that, different mechanisms can work together. While for Czech Republic, exports and imports are effective in explaining growth, for Bulgaria a two way relationship between exports and growth is reported. Finally for the case of Poland imports are found to be a vital part of economic growth. In this setting investigation of Turkey as an identical economy in terms of the localization in the constructed figures below seem to be vital and informative.

Figure 1: Exports and Growth in Euro Area

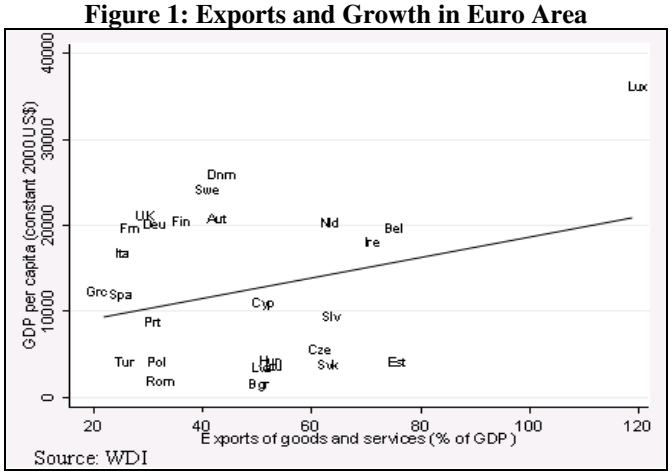
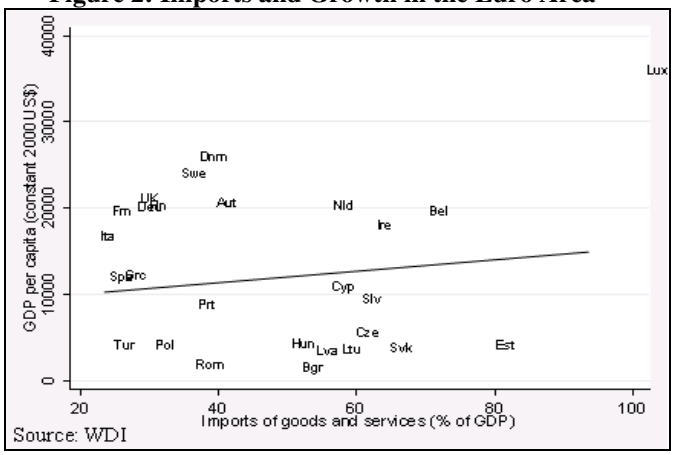


Figure 2: Imports and Growth in the Euro Area



Within such an environment before describing and implementing the multivariate models' investigation, the study also finds it necessary to give some introduction information regarding the foreign trade accounts of Turkey as well as the composition of the trade flows. While Turkey is observed to be a final good exporter, its composition of imports is different. Within this framework, decomposition of exports and imports should be investigated differently. When we observe the historical path of exports, results remark that industrial products has an average share of 84% for the post 1980 period, which represents the start of the liberalized era for Turkey. Moreover most recent statistics underline that EU has the highest share in the export targets of the country. Figures underline that in 2008 60% of total exports are to the Euro area. More interesting is the path of the composition of import volumes. While final remark regarding the causal relationship between imports and growth seems to be an empirical matter of fact, import led growth models remark the significance of intermediate and investment goods in the import composition whereas, growth led import understanding underlines the consumption goods share in the overall environment. Table 1 illustrates the historical developments in the composition of import volumes of Turkey for the post 1980 period. Findings indicate that for the post 1980 liberalization era, while composition of exports change slightly, import decomposition seems to realize a relatively stable path.

Table 1: Composition of Foreign Trade in Turkey

% of imports	**1983-1994**	**1995-2001**	**2002-2006**
Intermediate Goods	18.73	21.65	16.81
Investment Goods	75.71	67.42	71.17
Consumption Goods	5.38	10.39	11.36
% of exports	**1983-1994**	**1995-2001**	**2002-2006**
Agriculture	19.86	8.12	4.39
Mining	2.66	1.47	1.11
Industry	77.37	89.80	93.84

Source: TURKSTAT

METHODOLGY

To asses the causal relationship two sets of variables are used. Data set contains annual observations from 1950 to 2008 and obtained from Turkish Statistics Office (TURKSTAT). To account for economic growth Gross Domestic Product is used. On the other side of the relationship, international trade flows and openness is evaluated by using three major indicators; exports, imports and exports plus imports all as percentage of GDP are calculated. These three indicators are related with the economic growth indicator separately, one by one, to avoid some specification problems such as multicollinearity. The causal understanding between economic growth and openness will be evaluated via vector autoregressive (VAR) models for Turkey. Based on the cointegrating behavior of the variables, vector error correction type of augmented models will be constructed. Such an understanding may help one to distinguish the possible long run and short run dynamics of the relationship.

Initial point will be to apply the Augmented Dickey Fuller Tests -ADF- (Dickey, Fuller, 1979) to check for the stationarity of the variables under investigation. In case one deals with stationary I(0) variables, the VAR model can be estimated by using the system of equations one and two which illustrates a bi-variate (x and y) k^{th} order VAR model.

$$(1)\quad x_t = \eta_1 + \sum_{i=1}^{k} \omega_{1i} x_{t-i} + \sum_{i=1}^{k} \vartheta_{1i} y_{t-i} + u_{1t}$$

$$(2)\quad y_t = \eta_2 + \sum_{i=1}^{k} \omega_{2i} y_{t-i} + \sum_{i=1}^{k} \vartheta_{2i} x_{t-i} + u_{2t}$$

While identification of a causal relationship is followed by the so called Granger Causality tests (1969), the study finds it vital to concentrate on the impulse responses of the variables. Actually it is a fact that the Granger causality test concentrates on the predictability of the variables in reality. Standard F-test will be implemented for equations one and two respectively. Tested hypothesis is the joint significance of the variables under concern. Rejection of the null hypothesis will help us to comment on the possible causal link. In such a case we will be rejecting the hypothesis of y (x) does not Granger Cause x (y) in equation one (two).

However, like it is the case in most of the financial and macro economic data sets, one will be dealing with non stationary variables most of the time. The standard procedure is to transform the variables into a new one that is observed to be stationary. By doing so the order of integration of the non stationary variables are determined. Here the study finds it necessary to remark that such a transformation process most of the time cause one to loose some information contained in the actual levels of the data. This is the major remarks of Johansen (1988); non stationary variables should be checked for possible cointegrating relationship. If it is the case that one fails to detect any cointegration relationship, than estimation of the VAR model in the differences is an applicable process to follow, as illustrated in equations three and four.

$$(3)\ \Delta x_t = \eta_1 + \sum_{i=1}^{k} \omega_{1i} \Delta x_{t-i} + \sum_{i=1}^{k} \vartheta_{1i} \Delta y_{t-i} + u_{1t}$$

$$(4)\ \Delta y_t = \eta_2 + \sum_{i=1}^{k} \omega_{2i} \Delta y_{t-i} + \sum_{i=1}^{k} \vartheta_{2i} \Delta x_{t-i} + u_{2t}$$

While application of standard Granger type of test is valid under the specified equations, complementary applications can also be preferred. After understanding the Granger type of relationship, as discussed, the impulse response functions will be obtained. The response of the variables to one standard deviation innovation to the other variable will be constructed. The response is expected to die away in the medium run; what here more important is to understand the short term dynamics of the relationship.

On the contrary, detection of cointegration should be handled with cautious. It is no longer applicable and accurate to estimate a VAR model, instead an augmented VEC model should be preferred. Engle and Granger (1987) and Johansen (1988) underline that applying VECM solves the major problem of the VAR models. That is the lost information through out the transformation process of the non stationary variables. A linear combination of the two non stationary variables is injected into the VAR model, which enables the system of equations to work by using the variables in their non stationary forms. The fact is the stationary of the two cointegrated but non stationary variables. The so called error correction (EC) component which is illustrated in equations five and six contains the information regarding the long run relationship. By doing so while the major shortcoming of the VAR type of models using non stationary variables is solved, decomposition of the long run and short run dynamics is also sustained. While the EC component contains the long run relationship, a joint significance test to the lagged differences of the variables will asses the short run dynamics of the relationship, towards the long run equilibrium. As discussed by Johansen (1988) three major source of causality may prevail in the VEC models; one coming from the EC component, another coming from the lagged differences of the other variables and finally coming from the joint significance of the EC component and the lagged differences of the variables.

$$(5)\ \Delta x_t = \varsigma_1 + \kappa_{11} EC_{t-1} + \sum_{i=1}^{p-1} \gamma_{1i} \Delta x_{1t-i} + \sum_{i=1}^{p-1} \nu_{1i} \Delta y_{1t-i} + \varepsilon_{1t}$$

$$(6)\ \Delta y_t = \varsigma_2 + \kappa_{21} EC_{t-1} + \sum_{i=1}^{p-1} \gamma_{2i} \Delta x_{2t-i} + \sum_{i=1}^{p-1} \nu_{2i} \Delta y_{2t-i} + \varepsilon_{2t}$$

EMPRICAL FINDINGS

After capturing the general environment in Turkey, for the starting point all variables under concern are evaluated by using ADF test. Results reported in table 2 indicate that all variables are I (1) at 1% significance level. While estimation of VAR models in the traditional sense is one way to deal with the model, possible detection of cointegration is also checked.

Table 2: ADF Test Results

	GDP	Export/GDP	Import/GDP	Trade/GDP
y_t	3.43974	0.031	0.996	1.058
Δy_t	- 3.9466 ***	-8.483 ***	-5.974 ***	-5.895 ***

*** represents rejection of unit root at 1%

Table 3 summarizes Johansen co integration test results. Each of the I (1) trade variables are related with GDP, which is also I(1). Johansen (1988) cointegration test is applied. The choice of lag number in the Johansen setting is vital and affects the results severely. Choice of accurate lag level is done by comparing Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) that are obtained from the initial VAR models. For export case both criteria underline five as the relevant lag level, whereas for the other two variables the right lag level is found to be one. Results illustrated in table 2 indicate the absence of cointegration relationship between variables.

Table 3: Johansen Cointegration Test Results

	Trace Statistics for			5% Critical Values
Max rank	Export-GDP	Import-GDP	Trade-GDP	
0	11.2485 *	8.2028 *	10.6951*	15.41
1	1.0157	1.4765	3.3719	3.76

* represents the chosen co integration relationship

Findings here prevent the study to implement the augmented advanced VEC type of models. This actually gives a technical difficulty as the introduced VAR type of models in the first differences of variables are heavily criticized due to their low ability to construct the causal relationship. However the discussed shortcoming will be tried to be solved by applying some other test such as impulse response observations.

Within this framework three separate VAR models are estimated in the first differenced transformed forms of the variables. Similar to the Johansen test, lag selection of the VAR models are done by following the AIC and SIC information criterions. Selected lag levels are parallel to the previous findings that use VAR models in the levels of the variables to determine the accurate lag length of the Johansen cointegration test.

Table 4: Granger Causality Test Results

	F-Test stats (P- values)
GDP ≠> Exports	5.95076 (0.00035)
Exports ≠> GDP	16.1066 (0.07985)
GDP ≠> Imports	1.90829 (0.11507)
Imports ≠> GDP	1.59927 (0.18314)
GDP ≠> Trade	3.53386 (0.00991)
Trade ≠> GDP	3.15010 (0.01751)

Table 4 represents the Granger type of causality results. As pointed out previously, Granger type of causality is actually a predictability test, however the study find the initial findings crucial in the sense that, they represents one of the two major tools to asses the causal relationship within the technical limitations of the ongoing study. Findings here underline that for the pair of imports and growth, detection of a significant relationship seems

to be impossible. On the other hand for the remaining two cases, which relate exports and trade volumes separately with the GDP, there seems to be a two way causal relationship. Above all, to make a robustness check one may also concern about the impulse responses of the variables. Appendix gives a combination of the impulse response relationship between each of the models one by one. For exports, one can observe that there seems to be a three period and significant effect of GDP shock on export volumes whereas the reverse case seems to much more short living. Moreover the impact of the shock given to exports seems to be effecting economic growth with a lagged structure. For the case of imports, the results signal the absence of a significant impact running from imports to growth. However one may argue a very short lasting effect of economic growth on imports that seem to evolve in year three. Finally results regarding the trade volume and economic growth underline that, trade volumes response to economic growth is very short lived. However interestingly unlike the previous findings, trade volume as a measure of openness seems to effect economic growth for three periods and the effect is found to be significant.

CONCLUSION

While investigation of the effects of openness on economic growth is proved to be effective over various channels such as increasing transfer of goods and services to accelerate demand and supply based linkages in production, it is the modern growth models to emphasize knowledge and technology transfer. Moreover other alternative motives can underline the possible impacts of growth on international trade flows. Within such an understanding investigation of Turkey as a candidate country to EU, is informative. Results indicate that relationship between trade and growth is contradictory. While for import volumes and growth no significant relationship can be detected, other measures of international trade underlines the possible two way causal relationship. Although findings are found to be vital and informative, the study can be augmented by decomposing the export and import volumes. Moreover for the country set that Turkey belongs to some more advanced panel cointegration type of causal models can be constructed.

APPENDIX

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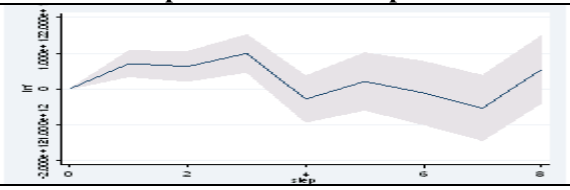
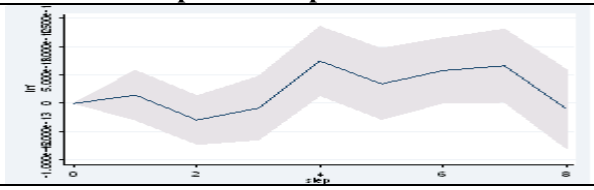
<tr><td>  </td><td>  </td></tr>
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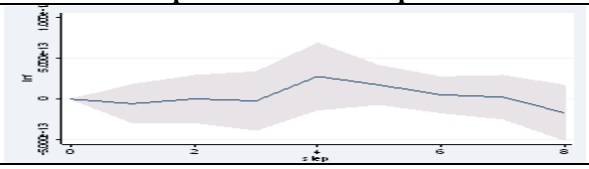
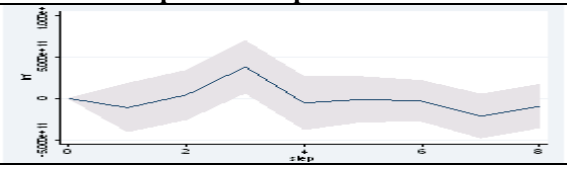
<tr><td>  </td><td>  </td></tr>
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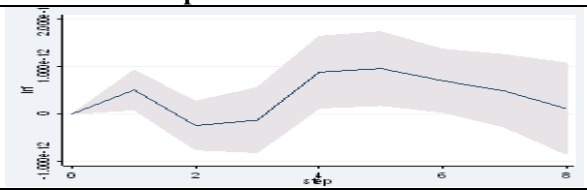
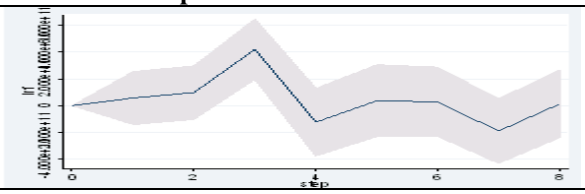
<tr><td>  </td><td>  </td></tr>
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