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Foreign Trade Sectors and Economic Growth

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Abstract: The purpose of this study is to determine the role of foreign trade sectors in economic growth, beyond testing the validity of growth hypothesis directed to export for Turkey's economy. For this purpose, the roles of total export, agricultural export, industrial export and mining export together with total import, capital goods import, consumption import and raw material import are analysed in economic growth. The gained results reveal the findings that industrial export, capital goods and raw material import are the determinants in the economic growth.

Key words: Economic growth, foreign trade, causality, JEL classification, F43, F41, C32

INTRODUCTION

In Turkey's economy, the strategy of industrialization directed at export has been adopted together with 24 January 1980 structural change and conversion decisions by abandoning the development strategy based on import replacement. Within this context, a free foreign exchange market has been established by terminating the exchange supervision. Within the context of the followed outward development strategy, the encouragements for export have been provided. The purpose of this study is to determine the role of foreign trade sectors in economic growth beyond testing the growth strategy directed to export for Turkey's economy. For this purpose, the relationship between agricultre, mining and industrial export (export and sub sectors of export) and economic growth has been searched. Additionally, the relationship between capital goods import, consumption goods import and raw material import (import and sub sectors of import) and economic growth has also been searched. This study is different from the available literature as it analyses the determinants of growth by sub sectors beyond testing the growth hypothesis directed to export.

Conceptual framework and literature: Export is the foreign demand for country's proceeds. The trade raises the proceeds and the rise of proceeds causes the rise of prosperity by increasing the employement and consumption. On the other hand, the trade increases the production facilites by causing technological development and enables the advantage of competition. The rise of exchange causes the rise of proceedigs by enabling the entrance of raw materials and capital goods import, which are necessary for domestic production especially in the developing countries. The effect of foreign trade on growth is known as the growth based on export in the economy literature. The growth strategy directed to export takes its reason from the theory of comparative superiorities. The growth strategy in question expresses the outward economy in which the obstacles of the foreign trade are abolished. An outward economy enables the distribution of optimal source by allocating the export sources from the inactive non-commercial sectors to foreign trade sectors, which are subjected to foreign trade (Fosu, 1990).

The relationship between export and growth in both developed and developing countries are being subjected to empirical analysis. There is an enormous literature between export and growth (Balassa, 1978; Heler and Porter, 1978; Michaely, 1977; Darrat, 1987; Ahmad and Kwan, 1991; Feder, 1983; Edwards, 1993) could be expressed as the studies that dominate the literature. The literature related to this subject could be classified in three basic groups in accordance with the econometric and statistical methods used, the studies in the first group are based on the calculation of the correlation between export and proceedings. The positive correlation coefficient between two variables means that export affects the economic growth positively. These studies are the first

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studies that search the relationship between export and growth and the studies of Michaely (1977), Balassa (1978), Heler and Porter (1978) and Tyler (1981) could be given as example. Such studies tend to test the growth to export based on countries community instead of individual countries. Second group studies explain the relationship between export and growth by regression analysis. In this study Fosu (1990) and Park and Prime (1997), the relationship between export and growth is being searched by using panel data as well.

The third group studies are the studies made by using time series (Ghatak, *et al*., 1997; Ghatak, 1998; Yamada, 1998; Islam, 1998). In these studies, the relationship between export and growth is tried to be determined by using Engle-Granger causality test, Vector AutoRegressive model (VAR) and Vector Error Correction Model (VECM).

MATERIALS AND METHODS

The relationship of causality between two or more variables is determined by using Engle-Granger causality test, Engle-Granger causality test and Vector Error Correction Model (VECM).

The relationship of causality between two variables is determined by using Engle-Granger causality test, if all of the variables are constant and I (0) (Enders, 2003). The causality relationship between GDP, EX and IM variables being I (0) are expressed by the following eqation:

$$GDP_t = \beta_{10} + i\sum_{i=1}^{N_{11}} \beta_{1i} GDP_{t-i} + \sum_{j=1}^{N_{12}} \beta_{12} EX_{12} + u_{1t} \quad (1a)$$

$$GDP_t = \beta_{10} + i\sum_{i=1}^{N_{11}} \beta_{1i} GDP_{t-i} + \sum_{j=1}^{N_{12}} \beta_{12} IM_{12} + u_{1t} \quad (1b)$$

$$EX_t = \beta_{20} + i\sum_{i=1}^{N_{21}} \beta_{21} GDP_{t-i} + \sum_{j=1}^{N_{22}} \beta_{12} EX_{22} + u_{2t} \quad (2a)$$

$$IM_t = \beta_{20} + i\sum_{i=1}^{N_{21}} \beta_{21} GDP_{t-i} + \sum_{j=1}^{N_{22}} \beta_{12} IM_{22} + u_{2t} \quad (2b)$$

Here, the equality is white noise processes, having the stable parameters in (1a, 1b) and (2a, 2b), β_{10} and β_{20} error terms, u_{1t} and u_{2t} zero average and stable variance. N_{11},N_{12}, N_{21} and N_{22} and depict optimal delay lengths. Following hypothesis are established for the Eq. (1a,b):

$$H_0 : \beta_{12j} = 0 \; j=1 \text{ and..} N_{12}$$
$$H_1 : \beta_{12j} \neq 0 \text{ if } H_0 \text{ hypothesis is rejected}$$

for at least one j, EX (IM) variable is the Granger cause of GDP variable. On the other hand, the following hypothesis are established for the Eq. 2:

$$H_0 : \beta_{21i} = 0 \; I=1 \text{ and..} N_{21}$$
$$H_1 : \beta_{21i} \neq 0 \text{ if } H_0 \text{basic hypothesis is rejected}$$

for at least one I, GDP variable is the Granger cause of EX (IM) variable. If H_0: β_{12j} and H_0: β_{21j} basic hypothesis are respectively rejected for the Eq. 1 and 2, there is a bilateral causality relationship between EX (IM) and GDP variables.

If EX (IM) and GDP series are not stable and they don't have a cointegration relationship between each other, in this case the causality relationship between EX (IM) and GDP variables is estimated by VAR. The VAR model for EX (IM) and GDP variables is depicted as in the Eq. 3 and 4:

$$\Delta GDP_t = \mu_{10} + \sum_{i=1}^{N_{11}} \mu_{11i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{12}} \mu_{12j} \Delta EX_{t-j} + u_{1t} \quad (3a)$$

$$\Delta GDP_t = \mu_{10} + \sum_{i=1}^{N_{11}} \mu_{11i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{12}} \mu_{12j} \Delta IM_{t-j} + u_{1t} \quad (3b)$$

$$H_0 : \mu_{12j} = 0 \; j = 1 \text{ and } ..N_{12}$$
$$H_1 : \mu_{12j} \neq 0 \text{ if } H_0 \text{ basic hypothesis is rejected}$$

for at least one j, there is a causality relationship from EX (IM) variable to GDP variable.

$$\Delta EX_t = \mu_{20} + \sum_{i=1}^{N_{21}} \mu_{21i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{22}} \mu_{22j} \Delta EX_{t-j} + u_{2t} \quad (4a)$$

$$\Delta IM_t = \mu_{20} + \sum_{i=1}^{N_{21}} \mu_{21i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{22}} \mu_{22j} \Delta IM_{t-j} + u_{2t} \quad (4b)$$

On the other hand, the following hypothesis are establised for the Eq. 4a, b:

$$H_0 : \mu_{21i} = 0 \; I=1 \text{ and....} N_{21}$$
$$H_1 : \mu_{21i} \neq 0 \text{ if } H_0 \text{ basic hypothesis is rejected}$$

for at least one i, there is a causality relationship from GDP variable to EX (IM) variable. If there is a long-period cointegration relationship between EX (IM) and GDP variables, although they are not stable, in this case, the convenient estimation method for determining the causality relationship between the variables in question

is Vector Error Correction (VEC) Model (Engle and Granger, 1987). Because cointegration does not show the direction of causality, although it gives at least a one directional causality relationship. Vector error correction model is depicted with the following Eq. 5 and 6:

$$\Delta GDP_t = \lambda_{10} + \sum_{i=1}^{N_{11}} \lambda_{11i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{12}} \lambda_{12j} \Delta EX_{t-j} + \lambda_{13} \varepsilon_{t-1} + u_{1t} \quad (5a)$$

$$\Delta GDP_t = \lambda_{10} + \sum_{i=1}^{N_{11}} \lambda_{11i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{12}} \lambda_{12j} \Delta IM_{t-j} + \lambda_{13} \varepsilon_{t-1} + u_{1t} \quad (5b)$$

$$\Delta EX_t = \lambda_{20} + \sum_{i=1}^{N_{21}} \lambda_{21i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{212}} \lambda_{22j} \Delta EX_{t-j} + \lambda_{23} \varepsilon_{t-1} + u_{2t} \quad (6a)$$

$$\Delta IM_t = \lambda_{20} + \sum_{i=1}^{N_{21}} \lambda_{21i} \Delta GDP_{t-i} + \sum_{j=1}^{N_{212}} \lambda_{22j} \Delta IM_{t-j} + \lambda_{23} \varepsilon_{t-1} + u_{2t} \quad (6b)$$

difference, N delay length, λ estimated parameters u_{1t} and u_{2t} error terms without autocorrelation ε_{t-1} and in the Eq. 5a,b and 6a, b are error correction terms, gained from the long-period cointegration relationship between GDP and EX (IM), given in the following Eq. 7a, b.

$$GDP_t = \alpha_0 + \alpha_1 EX_t + \varepsilon_t \quad (7a)$$

$$GDP_t = \alpha_0 + \alpha_1 IM_t + \varepsilon_t \quad (7b)$$

α_0 and α_1 long-period parameters in the Eq. 7 are long-period error terms. The change in the confirmed variable in each Eq. 5a, b and 6a, b are caused either by the delayed values of GDP and EX (IM) variables and the in equations (ε_1) of former terms. Vector error correction model and the existence of short and long-period causality can be tested. If the (λ_{12}) parameters, estimated from the delayed values of EX variable in the Eq. 5 and the parameters (λ_{21}), estimated from the delayed values of GDP varible in the Eq. 6 are statistically meaningful according to F (Wald) test, there is a causality relationship from EX variable to GDP variable for the Eq. 5. Similarly, there is a casuality relationship from GDP variable to EX variable for the Eq. 6.

The existence of long-period casuality relationship between GDP and EX variables is determined according to the parameters of error correction term. Error correction parameter is (λ_{13}) for the Eq. 5 (λ_{23}) and for the Eq. 6 and these parameters are tested, whether they are meaningful for t-test or not. If (λ_{12}) and (λ_{13}) are meaningful together, there is a causality relationship from EX variable to GDP variable for the Eq. 5 as a result of t-test. Similarly, if λ_{12} and λ_{13} parameters are meaningful together, there shall be a strong causality relationship from GDP variable to EX variable for the Eq. 6 as a result of F-test.

Table 1: ADF (Augmented Dickey-Fuller) test results

Variables	ADF test statistics	Critical values (5%)	(C; T;L)
GDP	-2.402253	-3.580623	C; T;0
EX	-1.785705	-3.580623	C; T;0
EXAC	-5.366754	-2.976263	C; T;0
EXMI	2.085836	-2.971853	C; -;0
EXIN	-1.944856	-2.971853	C; -;0
IM	-2.228659	-3.580623	C; T;0
IMIN	-2.827578	-3.580623	C; T;0
IMCO	-0.417468	-2.971853	C; - ;0
IMRM	-1.487618	-3.580623	C; T ;0
ΔGDP	-5.296948	-2.976263	C; - ;0
ΔEX	-5.366754	-2.976263	C; - ;0
ΔEXAC	-5.854264	-2.976263	C; - ;0
ΔEXMI	-3.109471	-2.976263	C; - ;0
ΔEXIN	-6.085927	-2.976263	C; - ;0
ΔIM	-6.599551	-2.976263	C; - ;0
ΔIMIN	-6.668941	-2.976263	C; - ;0
ΔIMCO	-7.097644	-2.976263	C; - ;0
ΔIMRM	-6.114473	-2.976263	C; - ;0

RESULTS AND DISCUSSION

The relationship between foreign trade sectors and economic growth has been searched for Turkey's economy. The period of 1980-2008 is analysed by annual data. The causality relationship between total export and agriculture, the export of mining and industrial sectors with GSMH is analysed.

Additionally, the causality relationship between total import and the import of capital goods, the import of consumption goods and raw material import with GSMH is analysed. The data are regulated by being acquired from TUIK and DPT. In the analysis, Gros National Product GNP, Total Export EX, agriculture sector export EXAC, Mining sector export EXMI, industry sector export EXIN, total import IM, capital goods import IMIN, consumption goods import and raw material import IMRN are used. Natural logarithms of all variables have been taken.

The series used in the analysis have been searched by Augmented Dickey-Fuller technique, whether they carry unit root or not. The analysis made to determine, whether they are stable or not are presented in Table 1. It is understood that the complete of proceeds and foreign trade series used in the analysis are not stable in 5% of significance level in the level values.

Table 2: Co-integration rank test of Johansen according to GNP

Variables	H_0	H_1	λ_{trace}	Critical value (5%)
EX	r = 0	r>0	11.92352	15.41
EXAC	r = 0	r>0	4.122275	15.41
EXMI	r = 0	r>0	3.469432	15.41
EXIN	r = 0	r>0	11.50358	15.41
IM	r = 0	r>0	9.215036	15.41
IMIN	r = 0	r>0	9.216132	15.41
IMCO	r = 0	r>0	5.398023	15.41
IMRM	r = 0	r>0	9.839717	15.41

Table 3: Var granger causality test

Direction of causality	Chi-sq (d.f.)	p value	Result
EX→GDP	10.10273 (2)	0.0064	Agree
GDP→EX	0.533968 (2)	0.7657	Decline
IM→GDP	8.740880 (2)	0.0126	Agree
GDP→IM	1.050614 (2)	0.5914	Decline
EX→IM	15.71067 (2)	0.0004	Agree
IM→EX	0.202995 (2)	0.9035	Decline
EXAC→GNP	0.159293 (2)	0.9234	Decline
GNP→EXAC	29.09018 (2)	0.0000	Agree
EXMI→GNP	3.763360 (2)	0.1523	Decline
GNP→EXMI	3.083026 (2)	0.2141	Decline
EXIN→GNP	11.37255 (2)	0.0034	Agree
GNP→EXIN	0.149625 (2)	0.9279	Decline
IMIN→GNP	11.46990 (2)	0.0032	Agree
GNP→IMIN	4.788556 (2)	0.0912	Agree
IMCO→GNP	7.667335 (2)	0.0216	Agree
GNP→IMCO	3.854165 (2)	0.1456	Decline
IMRM→GNP	5.289383 (2)	0.0710	Agree
GNP→IMRM	0.641670 (2)	0.7255	Decline

It is seen that when the first differences of the series are taken, they become stable. It is observed that the series which become stable by taking the first difference are not included in trend.

Johansen cointegration test has been made in order to detect whether the series act in concert in the long period with GSMH series and the results are presented in Table 2. No cointegration relationship between export and sub sectors of export agriculture, mining and industrial sectors export and the total import and capital goods, consumption goods import, raw material import with GSMH has been detected.

The causality relationship between non-stable variables without cointegration is made by Var Granger Causality Test. The results, gained by the test in question are presented in Table 3.

There is a one-way causality relationship between the total export and GSMH variable. It is seen that by the sub sectors of export, other sectors except of industrial export do no affect the economic growth. There is a one-way causality relationship from import to economic growth between the total import and economic growth. While there is a bi-directional causality relationship between capital goods and economic growth, consumption goods and raw material import affect the economic growth positively.

CONCLUSION

The role of foreign trade sectors in economic growth has been searched for 1980-2008 period, in which the rules of free market economy are applied in Turkey. It is seen that export is effective on economic growth. Among the sectors, industrial sector is the determinant in economic growth. There is a one-way causality relationship from total import to economic growth. Capital goods import is the basic determinant of the economic growth. While capital goods import affects economic growth, economic growth causes capital goods import. Economic growth is effective on raw material import. Import proceeds is almost the same with the analysis results of 1980-2008 period which includes the analysis results which was done during the 1968-2008 period consisting the political period of development strategy and yet was not presented. No causality relationship was found between capital goods import and economic growth in 1968-2008 period, differently from 1980-2008 period. As a result, while the hypothesis of growth directed to export is valid for Turkey's economy, capital goods of import and raw material import are the basic determinants of growth in Turkey's economy. It is understood that Turkey's economy substantially integrates with the world economy and that foreign trade is a significant factor in economic growth.

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