An Empirical Investigation on Determinants of Foreign Trade in Turkey

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In this study the results obtained from previous theoretical and practical studies were examined and the factors that determine foreign trade were analysed. For this purpose, considering the annual data belongs to 1994-2016 period unit root test, Co-integration test, short-term VAR analysis and Granger Causality analysis were performed in order to determine the relationship and the direction of impact between foreign trade balance and determinants of foreign trade. As a result of the econometric analysis we obtained parallel results with previous literature. While positive relationship has been found between foreign trade balance and foreign direct investments, as well as foreign income and reel exchange rate, a negative relationship has been found between domestic consumption and reel interest rate.

1. Introduction

While trade is regarded as the whole exchange activities of goods and services between the sellers and buyers, foreign trade is the reciprocal dimension of this process among countries. Reciprocal purchases and sales among countries are at the start of international trade activities. One of the two most important components of foreign trade are the export of products and services produced in the country to foreign countries and the other is the import of a product that is rare or not produced in a particular country. Foreign trade is one of the most important indicators in evaluating the economic situation of countries. Imports and exports figures are important for countries in giving true decisions about the future investments of the government and the private sector, as well as the creation of economic policies.

With the world trade which started from the 1980s and has grown rapidly for the last 20 years, Turkey's foreign trade has undoubtedly been affected positively. Integration and globalization tendencies that have taken place in the world have greatly increased the importance of foreign trade. Thanks to foreign trade, producers and consumers in distant places have established relations with each other through commercial activities. Commercial activities have contributed to the rapprochement and integration of societies. This, in turn, enabled countries to have similar economic structures.

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The first and most important aspect of globalization is the commercial activity. Foreign trade is one of the most important tools of globalization as well as a result of globalization. The basis of globalization is based on the fact that the world is a single market. Parallel to this situation, country borders are becoming more permeable and freedom in international trade is increasing. Foreign trade, however, enables countries to specialize in the production of specific products, to learn and accelerate new discoveries about the product, to enable countries to benefit from economies of scale, and at the same time to provide effective use of world production resources, labour and time. Besides these, foreign trade also allows producers and consumers to look for the best products in international markets.

As a result of global trade trends and policies, foreign trade has a very important effect on economic activity and growth. The aim of trade policies is to promote indigenous production, to protect domestic industries and domestic producers and to increase exports. Turkey needs to establish policies such as tax structure, exchange rate ratios, import control, foreign direct investment inflow, interest rates, export tax and foreign exchange bureau system in order to improve trade balance and increase economic activities. Turkey should consider the policies that have been successfully implemented in the world in order to remove the foreign trade deficit. In this context, the structural development of Turkish foreign trade in historical process has been examined according to the policies. Factors that constitute foreign trade in the historical course and which affect foreign trade have been tried to be examined extensively. There are a number of factors that are effective in the growth of foreign trade in Turkey as well as in the whole world. When studies on Turkey's foreign trade are examined, it can be seen that real exchange rate, real interest rate, foreign direct investment, R&D expenditure and technology, customs tariffs, incentives, gross domestic product, competitiveness, total factor productivity, stability, natural resource density, etc. are seen to have an impact on foreign trade.

Firstly this study tried to determine what the determinants of foreign trade are and what kind of effects these determinants might have on foreign trade. Secondly, the current state of foreign trade determinants of the Turkish economy, which integrates with global markets and will become an important player in the world economy in the future, is summarized both theoretically and econometrically. In the study the results of previous applied studies are also examined. Regression, co-integration and causality tests were conducted to determine the relationship between the determinants of foreign trade and the direction of the effect for Turkey. Considering the data belongs to 1990-2016 period, the relationship between the mentioned variables was tested, the findings were evaluated and recommendations were made for political decision makers.

This study on the determinants of foreign trade in Turkey between 1994 and 2016 consists of four parts. The first part of this study is the introduction and the second part discusses previous studies about the determinants of foreign trade. In the third part, determinants of foreign trade in the framework of theoretical explanations and applied policies have been used and measured for the period of 1994-2016 in an econometric empirical study. In the fourth part of this study, political proposals are examined based on theoretical explanations and econometric findings.

2. Literature Review

World-wide studies on the determinants of foreign trade have emerged, especially after the '80s, and afterwards with the rise of trade relations between countries. Some of the world-wide studies on the determinants of foreign trade and foreign trade are explored in this section.

Molendowski (1982) analysed the impacts and consequences of changing external conditions throughout the world on foreign trade and country economy in his study on Hungary's foreign trade. Molendowski has reported that changes in the world economy have led to undesirable effects on small-scale economies such as Hungary. For this reason, the researcher indicated that foreseeing the developments and taking measures accordingly will positively affect the country's economy and foreign trade.

Dominguez and Sequeira (1992) have emphasized in their studies the determinants of export performance of permanent firms in underdeveloped countries. As a result of the study, it has been determined that exporting strategy, product quality, product compatibility, use of labour costs and raw material advantages, distribution channels, export incentives, export reasons, firm competitiveness, informal market researches and firm's organizational characteristics affect the exporting performance.

Dwyer and Kent (1993) suggested that, the outward openness to the economy should increase, in the study they carried out on examining the determinants affecting imports because of the increasing trend of Australian imports in recent years. As a result of the openness, they indicated that the removal of protective policies increased the demand for imports and caused the decrease in domestic production.

Chwo-Ming and Zietlow (1995) studied the determinants of mutual trade between Asia and the Pacific countries. The determinants of the reciprocal trade of the 14 Asian-Pacific countries in the study model were

empirically tested. As a result of the study, factors such as political stability, geographical distance, cultural similarities, and membership status of the Southeast Asian Nations Association (ASEAN) were found to be the main determinants of mutual trade between these countries.

Shoham (1997) defines export performance as the composition of the company's international sales and divides export performance into three sub-dimensions (sales, profits and change). In addition, the ratio of exports to total sales, the numerical size of export sales, and market share are the determinants of export performance according to the researcher.

Styles (1998) has attempted to identify similarities of the determinants of the export in different cultures in their comparative studies in England and Australia. A result of the study showed that export performance scales divided into two as hard (sales endorsement and gross profit) and soft (perceptions) it has been found that there is a similarity in terms of the factors affecting export and power of impact to the export, there is a difference between the impact strength.

Hanson (1998) investigated the effects of free foreign trade policy practices in the European Union and made predictions for the future by comparing it with the applied foreign trade policies in the past. As a result of the study it has been indicated that, the protectionist policies have gradually been disappeared and foreign trade volume has increased rapidly with the integration in the world. It is also stated that the economies that cannot adopt developments will collapse over time.

Beamish et al. (1999) found that there is a relationship between income derived from exports and organizational structure in their research on 185 enterprises in Australia. In addition, they indicated that, export performance varies depending on the stage of internationalization. In this context, they expressed that the export revenues of the enterprises which are in the advanced stages of the internalization period are higher.

Dutta and Ahmed (1999) estimated the import function of Bangladesh using quarterly data for the period 1974-1994. In the study that co-integration and error correcting model has been used, the relationship between real import prices, real gross domestic product and real international reserves has been investigated with Engle-Granger and Johansen co-integration method. Short term relationships were estimated with two different error correction models and error correction term was found significant in both models. In both models, researchers found that import demand was sensitive to changes in import prices and that import demand was lRDly the result of real GDP.

Katsikeas, Leonidas and Morgan (2000) summarized export performance determinants in two groups: background variables (environmental factors, organizational factors, managerial factors) and process variables (goal setting factors, marketing strategy factors). Together with their sub-determinants, they found 42 performance indicators, 23 of are economical, 14 are non-economic and 5 of are generic. The ratio of exports to sales, export profitability, growth of export sales, absolute size of export sales, growth in export/sales ratio are considered as the determinants of performance determinants.

Catao and Falcetti (2002) have determined the contributions of the applied trade reforms in the late 1980s and 1990s to country's foreign trade and also economy with models and tests in their study on the determinants of Argentina's foreign trade. As a result of the study it has been determined that foreign trade accelerated thanks to trade facilitation policies.

Tang (2002) investigated the determinants of imports with the general import structure of Bangladesh in his study. Tang (2002) considered real gross domestic product, private sector spending and government spending as key determinants. At the same time, as another determinant, he used relative prices. He used the boundary test approach and the error correction model in his work. In addition the data belongs to 1965-1998 period was used in the study. As a result of the study, it has found that import demand is particularly influenced by export product spending in Bangladesh.

Duman and Samadow (2003) found that due to their geographical closeness and complementary economic structure, having different production structures will result in great commercial potential between Turkey and Russia.

Dutta and Ahmed (2004) estimated the import function for India using annual data for the period 1971-1995. The researchers used the co-integration and error correction model approach in the empirical analysis of the import demand. As an explanatory variable for the quantity of imports in the model; relative prices, real income and a dummy variable is exist to measure the effects of 1991 liberation that take the value "0" for the period 1971-1991 and "1" for the period 1992-1995. As a result of the Johansen multiple co-integration test it has found that import is co-integrated with relative prices and real income. As a result of this error correction model, real income is found to be an important variable substantially affecting imports, while imports are less sensitive to relative prices. In addition, the study concluded that 1991 liberalization had a very small effect on import demand.

Fugazza (2004) investigated the determinants of exports and how effective these determinants are in exports and the country's economy, and found that these determinants in Africa and the Middle East have a significant influence on the export and the country's economy.

Yücel (2006) has investigated the factors affecting export and import supply and demand as the determinants of foreign trade and the basic approaches used in foreign trade models from the theoretical point of view. These factors are collected under two sub-headings as primary and secondary factors. The researcher used domestic and foreign income levels, relative prices and exchange rate volatility as primary factors and trade reforms, monetary and fiscal policy instruments, firm-level factors and research-development (R&D) expenditures, natural resource intensity, scale economy and competitiveness as secondary factors. In addition, the researcher examined the trends in the world economy under the category of secondary factors.

Marquez-Ramos (2007), in his study conducted on the determinants of foreign trade in Ghana gave information about foreign trade in African countries in general and compared Ghana's foreign trade with other African countries. However, developed Republic of South Africa and developing Ghana constituted the basis of the study. Marquez-Ramos showed that the impacts of the factors affecting foreign trade vary between the countries. In the study, it was determined that geographical structure and social factors are the main determinants of foreign trade in Republic of South Africa and Ghana.

Aker (2008) emphasized that Turkey's imports have been increasing steadily in his study on Turkeys main determinants of imports. Aker investigated the reasons of this increase. As a result of the analysis, it was determined that the sectors in which Turkish imports increase by 85-90% are capital goods, intermediary goods and raw materials, and only 15% are consumer goods. Aker tested economic growth, fixed capital investments, Customs Union Treaty with the European Union countries and real effective exchange rate ratios. As a result of the regression analysis it was determined that Customs Union Treaty has no significant effect on Turkish imports.

Örnek (2008) investigated the effects of foreign capital flows on domestic saving and economic growth in Turkey using time series data over the quarterly period 1996:4-2006:1. As a result of the study it was found that foreign direct investments have significantly positive effects on domestic saving for both short and long-term, however short term capital inflows have negative effect on domestic savings for both short and long-term. It has also been found that short-term capital inflows and foreign direct investments have positive effects on economic growth.

Jude and Pop Silaghi (2008) investigated foreign trade policies and foreign direct investments that triggered and enhanced economic growth in Romania in the new period following the communist regime. As a result of the study it has been found that foreign trade policies, foreign direct investments and agreements with EU countries quite effective on economic growth.

Pekkanen (2008) analysed the contributions of aggressive and enclave trade policies carried out in the past, arrangements in these policies according to the changing conditions in the global context, to foreign trade and growth of Japan As a result of the analysis, it was stated that Japan's foreign trade entered into a rapid growth process with the adoption of free foreign trade policies that are appropriate to the changing conditions of the day instead of enclave policies.

Jaussaud (2009) analyzed the determinants of the Japanese sectoral imports from China and USA over the period 1971-2007. Using the Saikkonen-Lütkepohl method the researcher estimated co-integration relationships with breaks. For raw materials, textile, mineral fuel, chemicals and machinery and equipment sectors Jassaud (2009) showed that if the domestic demand affects positively the imports, the impact of prices changes can be different whether the relative prices retained or considered both domestic and import prices. As a result of the study it has been found that relative prices changes have a negative effect on imports. In addition it has also been found that domestic demands have positive effects on imports.

Mohammad (2010) investigated the long run as well as short run determinant of trade deficit with reference to Pakistan by using Johansen co-integration approach and error correction model (ECM). As a result of the study it has been found that foreign income, foreign direct investment, domestic household consumption and real effective exchange rate have significant effect on trade deficit.

Soukiazis and Antunes (2011) investigated whether openness, export shares or trade balances affect regional growth in Portugal or not. In the study human capital was also considered as a conditional factor to growth. In this context the researchers have analysed whether the combination of foreign trade and human capital is relevant to explain regional growth in Portugal and how it affects the convergence process between the regions. As a result of the study it has been determined that foreign trade has an important affect both on regional and whole Portugal economic growth. In addition, it has also been found that cumin capital and sectoral labour share are relevant to explain regional growth and convergence in Portugal.

3. Method and Findings

In this section, real exchange rate, AR-GE expenditures, foreign income, domestic consumption, real interest rate, foreign direct investment will be evaluated in terms of Turkey, which are accepted as determinants of foreign trade in the literature. The data represents annual data covering the 1994-2016 periods. These series have been obtained from the data distribution system in the World Bank, OECD, Central Bank of the Republic of Turkey, and TurkStat.

It is important for the significance of the analysis to be carried out whether the variables have a consistency in themselves in order to be able to explain the meaningful causality relationship between the RER, FTB, RIR, DCR, FI, RD, FDI variables which are important for foreign trade determinants. For this reason it is necessary to determine whether the variables are stationary or not and if they are stationary in which level they became stationary. For this, ADF and PP unit root test statistics must be conducted. In the econometric study, the characteristic that the series belonging to any variable has in the long term can be explained by determining the value of the variable in the previous period and how it affects this period. For this reason, in order to understand how a series comes from, it is extremely important to find a regression with the values of the previous period in the value of the series in each period. However, various methods have been developed for this, it is explained whether the series are stationary by the method known in econometrics as unit root analysis (Tari, 2008, p.393).

3.1. Unit Root Test

In time series analysis, it is not correct to go directly to the solution of the model. The most important reason for this is that macroeconomic time series are generally not stable. First, it is necessary to check whether the time series used in the model is stationary or not. If the statistical properties such as mean, variance, autocorrelation are all do not change over time these are called as stationary time series. The use of non-stationary time series may lead to a non-existent relationship between variables in the prediction model. The non-stationary series are being made stationary by taking the first or second differences (Gujarati, 1999: 713).

In order to obtain significant relationships between the variables used in econometric models, the series of variables must be stationary or in other words should not include a unit root. In this study, extended Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to investigate the unit root existence. The results of the ADF unit root test are obtained using equation (1).

$$\Delta Y_t = pY_{t-1} + \sum_{i=1}^{m} \gamma_i \, \Delta Y_{t=i} + \varepsilon_t \quad (1)$$

In the above equation, t represents the difference operator, Y represents the variable and ε_t the error term. The ADF test tests whether the δ coefficient is statistically equal to zero or not. This test is made by comparing the calculated ADF-t statistic with Mac Kinnon critical values. Being bigger of the ADF test statistic is absolutely than the Mac Kinnon critical values, indicating that the time series discussed does not include the unit root. The common practice proposed by Engle and Granger is the Augmented Dickey Fuller (ADF) test when determining stationary level of a variable or whether a variable is stationary or not after the first difference is receipt (Granger, 1987, p.251).

If the absolute t value of the ADF statistic calculated according to the ADF test is bigger than the limit values of 1%, 5% and 10%, the null hypothesis that constituted as the unit root does not exist (stopped) is rejected, in other words it is considered as stationary. The unit root test results are seen in Table 1.

Table 1. *Unit root test results*

Variables	ADF at level	ADF at first difference	PP at level	PP at first difference
LFDI	-3.040489(2)*	-5.483039(2)*	-3.011218(2)*	-5.939053(2)*
LRER	-0.238989(2)*	-5.452931(2)*	-0.139151(2)*	-5.46934(2)*
LRIR	-0.029276(2)*	-3.957273(2)*	-0.028707(2)*	-3.952528(2)*
LRD	-2.733810(2)*	-6.673414(2)*	-2.757965(2)*	-6.673414(2)*
LTFB	-3.519852(2)*	-4.528458(2)*	-1.015063(2)*	-4.528656(2)*
LDCR	-3.591555(2)*	-3.980806(2)*	-3.533152(2)*	-6.885188(2)*
LFI	-3.095361(2)*	-3.956634(2)*	-3.801310(2)*	-6.319571(2)*

According to the unit root test for the level values of LFDI, LRER, LRIR, LRD, LFTB, LDCR, LFI variables; the absolute value of the ADF and PP test statistic is less than the Mac Kinnon critical values at the 1% significance level. For this reason, the null hypothesis that the series contain unit root at the level value is accepted. In this case the series are not stationary. When the first differences of the variables included in the

analysis are taken, the t statistic values are greater than the test critical values, in which case all the series are at a level of 1%.

3.2. Co-Integration Test

In econometric models, co-integration test is used to determine whether two or more non-stationary series act together in the long run or not in econometric models. The relationship between the variables in the long run is tested by using Engle-Granger or Johansen-Juselius (JJ) techniques after the differences of the non-stationary series are taken and stabilized at the same level (Barışık and Demircioğlu, 2006, p.76).

$$X_t = a_0 + a_1 Y_t + u_t \quad (2)$$
$$Y_t = b_0 + b_1 X_t + u_r \quad (3)$$

This can be achieved using one of the regressions. By finding one of these regressions, the "e_t" error terms are obtained with the help of it. In the above equations X and Y represents the two variables in which long-term theoretical causality relation is searched, a_0 and b_0 are the constant terms, a_1 and b_1 are the regression estimation coefficients, ut and u't represent regression error terms.

According to this,

$$e_t = \delta e_{t-1} + v_t \quad (4)$$

In this study, JJ multivariate cointegration technique, which allows estimation of the long-term relationship with the maximum likelihood method, is used to examine the cointegration relation. The JJ test utilizes two different statistics called trace and maximum eigenvalue in order to find the number of vectors showing cointegration feature.

Table 2. Cointegration analysis results

H_0	H_1	Maximum Eigenvalue	5%	1%	H_0	H_1	Trace Values	5%	1%	Prob.
R = 0	r = 1	49.82396**	46.23142	52.30821	r = 0	r ≥ 0	149.4365**	125.6154	135.9732	0.0000
R ≤ 1	r = 2	46.45728**	40.07757	45.86900	r ≤ 1	r ≥ 1	109.6125**	95.75366	104.9615	0.0009
R ≤ 2	r = 3	22.50181	33.87687	39.37013	r ≤ 2	r ≥ 2	65.15527	69.81889	77.81884	0.0407
R ≤ 3	r = 4	16.26077	27.58434	32.71527	r ≤ 3	r ≥ 3	42.65347	47.85613	54.68150	0.0736
R ≤ 4	r = 5	14.05181	21.13162	25.86121	r ≤ 4	r ≥ 4	26.39270	29.79707	35.45817	0.0088
R ≤ 5	r = 6	8.021744	14.26460	18.52001	r ≤ 5	r ≥ 5	12.34089	15.49471	19.93711	0.0088

Note: (*) (**) shows 5% and 1% levels (Delay lengths are used as 1)

According to the predicted results in Table 2, it is found that there are two co-integrated vectors in the co-integration model. These results indicate the existence of a long-term relationship between the series. Therefore, it can be seen that the vector autoregressive model has a coherent structure and that the variables are useful to analyze by the method of the causal causality.

Table 3. Normalized foreign trade variable

FTB	FDI	DCR	RER	RID	RD	FI
1.000000	0.000000	11.058974	-8.118296	5.016210	1.098296	-15.016210
		(2.01524)*	(1.074071)*	(0.62131)*	(0.08071)*	(3.13259)*
0.000000	1.000000	32.93519	-9.160680	3.97548	-0.160680	-6.12549
		(3.57297)*	(1.21365)*	(0.32048)*	(0.02145)*	(0.087458)*

Note: * Significance at 5%, The natural logarithm of the variables is taken into account.

When the normalized equation in Table 3 is examined, it is seen that domestic consumption rate (DCR) and real interest rate (RIR) and R&D (RD) expenditures have a negative effect on the foreign trade balance (FTB), it is also seen that foreign income (FI) and real exchange rate (RER) have a positive effect on foreign trade balance (FTB). If the domestic consumption rate increases, it will affect the increase in imports because the domestic consumers will increase the demand for domestic and foreign goods. This situation has a detrimental effect on foreign trade balance. In the event of an increase in foreign incomes, since foreign consumers demand more goods and services and this will increase which in turn has a positive effect on foreign

trade balance. In case of increase in real interest rate, the decrease in investments and consequent decrease in production will cause exports to decrease. This situation negatively affects foreign trade balance. It is seen that R&D expenditures have negative affect in long rung. This is due to the fact that Turkey, which has been developing in the long run, has been making intermediate imports and technology intensive imports especially since 1980. This has a detrimental effect on trade balance.

3.3. VAR Model Short Term Analysis

Vector Autoregressive (VAR) models developed by Sims (1980) and based on the Granger Causality Test Model (Granger, 1969) provides an analysis of the relationships between each other. VAR models consist of a regression of each variable studied on the current and past values of all variables in the model.

For a system with ρ variable, a VAR model with k delay times can be written as follows.

$$Y_t = A_1Y_{t-1} + A_2Y_{t-2} + \cdots + A_kY_{t-k} + BX_t + E \quad (5)$$

In this system which has ρ number of equations, Y_t is the vector of ρ dimensional inner variables; A_1, A_2, ..., A_k and B, ρ × ρ dimensional coefficients matrix; t X is the ρ dimensional deterministic variable vector consisting of the fixed term, linear trend, and dummy variables, and t ε is the vector of error terms providing all the ρ dimensional assumptions. It is necessary to show the short-term movements associated with the long-run variables with the VAR model. For this reason, in the following equation, the VECM is constructed to cover the obtained error correction term.

The model used in the analysis is:

$$\Delta FTB = \alpha_1 + \beta_1\Delta RIR - \beta_2\Delta RIR + \beta_3\Delta RER + \beta_4\Delta RD + \beta_5\Delta FI - \beta_6\Delta DCR - ECM_{t-1}$$

Variables included in the model are:
ΔLFTB = Foreign Trade Balance
ΔLFDI = Foreign Direct Investments
ΔLRIR = Real Interest Rate
ΔLRER = Real Exchange Rate
ΔLDCR = Domestic Consumption Rate
ΔLFI = Foreign Income
ΔLRD = R&D Expenditure

Table 4. VAR analysis results

Variables	ΔFDI_{t-1}	ΔRIR_{t-1}	ΔRER_{t-1}	ΔFI_{t-1}	ΔDCR_{t-1}	ΔRD_{t-1}	C (α)	ECM_{t-1}
t value	4.352	-1.635	2.806	0.951	-1.774	1.565	1.745	-1.856
Coefficient	10.877	-13.610	26.650	29.348	92.539	5.942	2.873	-0.604
R^2		= 0.683173		Durbin Watson			= 11.882660	
Corrected R^2		= 0.577564		Akaike info Criteria			= 16.65292	
				Schwarz Criteria			= 16.95135	
F statistics		= 14.52310		Hannan Quinn Criteria			= 16.71768	

The optimal delay length for each variable 4 was found to be 2 with Akaike Information Criteria (Table 4). Here, the negative value of the error term of the equation and also statistically significant shows that the error correction model works. Because since the "ECM" expressed in the equation found which is the adjustment speed value of the short term is found as 0.60 shows that there is a causal relationship between the real interest rate, the real exchange rate, the foreign income, the domestic consumption rate, the R&-D expenditures and the FTB. As a result of the VAR analysis R^2 found as 0.683173. According to this result, 68% of the changes in foreign trade determinants are explained with the changes in FDI, RD, RER, RIR, FI, DCR variables. The explanation power of the model is high and the alignment of the regression line is very good. Durbin Watson (DW) found as 11.882. Durbin Watson is a criteria used to determine if there is autocorrelation between residues in a statistical regression. Since the value of DW obtained here is accepted because it is larger than the value in the table. F statistics found as 14.52310. If the obtained F value is smaller than the table F, the hypothesis is accepted, if it is big the hypothesis is rejected. Since F_{calc}= 14.52310 > F_{tab} = 3.07, the H_0 hypothesis is rejected. In other words, the regression is entirely significant.

Between 1994 and 2016 there is a significant linear correlation between FDI and FI, RER, R&D and FDI in annual data. There is a negative relationship between FTB and DCR, RIR. Because the consumption of domestic goods will increase with the increment of the foreign income, the trade will be positively affected and there will be a trend towards improvement of the foreign trade balance. There is a positive relationship

between RIR and FTB. There is a negative relationship between RIR and FTB in short-run. That is, the increase in the value of the real exchange rate will cause an increase in demand as the price of goods in the country will be lowered by foreigners. This will have a positive impact on the trade balance as it will affect the revival of exports. That is, an increase in real interest rates will reduce investments and this will show its affect on export and will negatively affect foreign trade balance. There is a positive relationship between foreign direct investments (FDI) and foreign trade balance (FTB). In other words, the increase in foreign direct investments will increase the country's production, the production will increase the export trade, and the foreign trade balance will improve. The increase in the domestic consumption rate (DCR) will reduce the FTB. This is because domestic consumers will increase demand for domestic and foreign goods, which will lead to an increase in imports and at the same time increase the domestic demand for export goods, which will have a negative impact on foreign trade balance.

3.4. Granger Test Results

The Granger causality test was developed to test the existence of a statistically significant relationship between the two variables and empirically (Granger, 1969). The Granger causality test has been one of the most preferred methods in empirical studies aimed at revealing the predictive power of variables due to its applicability for convenience. In this test, the series become stationary, and after the series are brought to the stationary position, the variables must be aligned from the outside to the inside. Granger causality test results are presented in Table 5 in detail.

$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i rer_{t-i} + u_t \quad (6)$$
$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i rir_{t-i} + u_t \quad (7)$$
$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i rd_{t-i} + u_t \quad (8)$$
$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i fi_{t-i} + u_t \quad (9)$$
$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i dcri_{t-i} + u_t \quad (10)$$
$$FTB = a_0 + \sum_{i=1}^{2} a_i ftb_{t-1} + \sum_{i=1} b_i fdi_{t-i} + u_t \quad (11)$$

The Granger causality test was applied to determine the direction of the relationship between variables. Determining the number of delays is an important application problem. Granger causality test sensitive to delay number. For this reason Davidson and Mac Kinnon are recommended to use fewer than much delay number (Gujarati, 2009, pp. 620-621). Since annual data are used in the study, the delay length is taken as 2 and the results of this delay length are shown in table 5, presented below.

Table 5. Granger causality test results (1994-2016).

Null Hypotheses	Number of observations	F statistics	Possibility (p)
FTB is not Granger cause of R&D	20	0.16898	0.71461
R&D is not Granger cause of FTB	20	1.06370	0.36922
FTB is not Granger cause of FDI	20	0.84741	0.44329
FDI is not Granger cause of FTB	20	4.96825	0.01986
FTB is not Granger cause of RER	20	0.37426	0.69407
RER is not Granger cause of FTB	20	3.87126	0.02397
FTB is not Granger cause of RIR	20	0.31638	0.51335
RIR is not Granger cause of FTB	20	4.74280	0.01412
FTB is not Granger cause of FI	20	0.12807	0.83065
FI is not Granger cause of FTB	20	5.89654	0.01156
FTB is not Granger cause of DCR	20	0.08245	0.92267
DCR is not Granger cause of FTB	20	4.86992	0.01294

The analysis involved a number of 20 observations, with a length of delay of 2, by taking the differences of the variables.

As seen in Table 5, there is a correct causality from FDI, RER, RIR, FI and DCR to FTB at 5% significance level, there is not any causality from R&D to FTB. In addition, there is not any causality from FTB to R&D, FDI, RER, RIR, FI and DCR.

This situation shows the existence of a unidirectional Granger causality relation from foreign direct investment, real exchange rate, real interest rate, foreign income, domestic consumption to foreign trade equilibrium in Turkey in the 1994-2016 time period.

4. Conclusion and Discussion

This study focuses on the determinants of foreign trade as a consequence of globalization, a reality of today's world economy. In this context, the determinants of foreign trade in Turkey between 1994 and 2016 were researched and whether there is a long and short-term relationship between these determinants. As a result of the study, it was observed that the diversity of the determinants of foreign trade together with the rapid increase in foreign trade balance and production increased, and the reflection of this diversity and effectiveness with econometric analysis.

As a result of the econometric analysis it has been found that foreign direct investments, real exchange rate, real interest rate, domestic consumption rate, foreign income and R&D expenditures affect the changes in foreign trade balance in Turkey.

The most important results of the econometric analysis are as follows.

The ADF test was used to determine the stability of the time series used in the analysis. According to the ADF test statistic results; it is understood that the series are stationary when the t-statistic value of the first difference of the FTB, RIR, RER, FI, DCR, AR-GE, FDI is high in the test critical values. Cointegration test developed by Johansen was used to investigate the existence of a long-run relationship between variables that became stationary at the same level. According to the obtained results, it is determined that there are two co-integrated vectors in the co-integration model. These results indicate the existence of a long-run relationship between the series.

Therefore, the variance of Granger causality analysis was analyzed as the considered vector has a coherent structure with autoregressive model. Conclusions have been drawn in accordance with the expectations set out in the literature. According to the results of the normalization test, the increases in FI, RER, AR-GE in the long run positively affected the foreign trade balance, while DCR and RIR had a negative effect on the foreign trade balance.

According to the results of the normalization test, the increases in FI, RER, AR-GE in the long run positively affected the foreign trade balance, while DCR and RIR had a negative effect on the foreign trade balance. In other words, R&D expenditures, foreign income, foreign direct investments and real exchange rate increases have a positive effect on foreign trade balance; real interest rate and domestic consumption rate have negative effect on foreign trade balance.

There will be a hot money flow to the country within the periods that the interest rates are higher; there will also be an increase in the foreign exchange supply as a result of hot money flow. There will be a decrease in exchange rates and since export goods at low exchange rates will become expensive for foreigners the export will decrease. However, from a long-term perspective, it is expected that imports will increase. As a result of this change in both export and import, foreign trade balance is negatively affected. At the same time, when interest rates increase, investments will decrease, growth will slow down and foreign trade balance will be adversely affected.

An increase in R & D expenditures, which is another variable, has a positive effect on the short run. Because R&D expenditures do not show the effects immediately in short-run it affects foreign balance positively. However, in the long run, R&D expenditures have a negative impact, which is a long-term technology intensive import effect because Turkey is a developing country.

The increase in real exchange rate, in other words, when the national currency depreciates, the country will decrease its foreign trade deficit as a result of the increase in the competitiveness of the country and the decrease in imports on the other hand.

The increase in foreign income, will increase the exporting power of the counterpart, as foreigners increase their purchasing power, and thus have an effect of improving the trade balance. The increase in the domestic consumption rate will increase the demand of domestic consumers for imported goods, which will have a detrimental effect on the foreign trade balance.

In the long run, short-term analyzes of foreign trade determinants have been examined. After the short-run analysis, the long-term causality relation between the variables was also found in the short term. The factors affecting the determinants of foreign trade in the short term also gave the same result in the long term.

Findings emerging after the analysis reveal the importance of FI, RER, RD, DCR, RIR policies because the determinants of foreign trade also affect the national income of the country at the same time. In this context, it is important that real exchange rate adjustments are made at realistic exchange rates because of the positive effect of foreign trade in Turkey. On the other hand, in order to minimize the negative effects of the interest-rate relationship on the macroeconomic performance, it is necessary to reduce interest rates and take measures to maintain fiscal discipline and price stability. The share allocated to R&D expenditures in Turkey is 0,84% as of 2010. The criterion for being a developed country is at least 2%. For this reason, Turkey

should withdraw its share of GDP from R & D to 2% levels, known as developed countries in the short and medium-term, and should exceed this rate in the long run. Arrangements should be made to encourage innovation and inventions for R&D. On the other hand, as the increase in foreign direct investments has an effect of improving the trade balance, it is necessary to prioritize advantageous regions for investment. Elimination of the political and bureaucratic obstacles in front of foreign direct investments and appropriate incentive policies to direct foreign direct investments to Turkey is needed. Foreign investors should be encouraged to invest in the intermediary and investment goods of the country, tax burden on employment should be reduced and energy costs should be reduced to the desired level according to the competitor countries. At the same time, as domestic consumption increases is adversely affected foreign trade, it is necessary for domestic consumers to reduce demand for imported goods and to follow import substitution policy for intermediate goods, investment goods and consumer goods.

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