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The Relationship Between Trade Openness, Foreign Trade Tax Revenues and GDP in Turkey: ARDL Bounds Test Approach for 1993-2019 Period

Türkiye'de Ticari Açıklık, Dış Ticaret Vergi Gelirleri ve GSYH Arasındaki İlişki: 1993-2019 Dönemi için ARDL Sınır Testi Yaklaşımı

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Abstract: The level of trade openness and the impact of foreign trade taxes on GDP is one of the frequently discussed topics in the literature. Especially with the globalization and economic integration movements, analyzing these factors related to the foreign trade of the countries has become a subject of vital importance and attracting attention among researchers. However, there is no generally accepted opinion regarding the extent and direction of the effects of these two factors on GDP. Because the level of trade openness (export + import) and the size of the foreign trade tax revenues vary from country to country. This study examined under the influence of Turkey. By determining the magnitude and direction of this effect in Turkey, the study is intended to contribute to the literature, decisions related to foreign trade and future researchers. In this study which is conducted for the period 1993-2019, ARDL Bounds Test Method was used. As a result of the analysis, a low and negative relationship was found in Turkey from foreign trade tax revenues to GDP. On the other hand, a positive and meaningful relationship to GDP was determined from the level of trade openness. These definitions show that additional tax obligations imposed on foreign trade in order to increase tax revenues in Turkey negatively affect growth, while the opening of the use of economic instruments to foreign investors and consumers positively affects economic growth.

Structured Abstract: Globalization and digitalization movements, which increase their influence thoroughly today, are also effective in shaping the foreign trade of countries. Currently, the status of foreign trade of countries is evaluated by the level of trade openness to the outside. This level has a significant impact on the tax revenues that countries receive from foreign trade and therefore their economic growth. This study has been prepared to determine this situation for Turkey.

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Since the 1980s, Turkey has guided its economy with liberalization and outward orientation policies. These policies have made significant changes to Turkey's export and import items. These two items are essentially the basic two items used to measure a country's trade openness. The most common method to calculate trade openness is $[(\text{Export} + \text{Import}) / \text{GDP}]$ formula. An increase in this value indicates that a country's trade is more open to the outside, while a decrease in value indicates the opposite; the economy tends to be inward.

A country's trade openness can have many benefits at the macroeconomic level. Examples of these benefits; facilitating the supply of raw materials, intermediate goods and energy, increase in exports, thus increasing employment and economic growth, increasing development and prosperity, etc. attributable. However, within the scope of this study, the issue of trade openness is analyzed from a tax-related perspective. It is interpreted that the increase in foreign trade transactions of a country will increase tax revenues, considering that tax will be collected from these transactions. In particular, the introduction of various additional obligations for export and import operations will affect increasing tax revenues in addition to the customs duty, the most famous foreign trade tax.

These issues mentioned above, namely the level of commercial openness to foreign trade and the issue of tax revenues from foreign trade, constitute the basis of this study. The aim of the study is to analyze whether these two factors have an impact on economic growth in Turkey. There is no consensus in the literature on whether these two factors have an effect and if they have an effect, whether it is positive or negative. Conceptual discussions aside, looking at the literature on econometric analysis, it seems that different results have been determined both for Turkey and for other countries.

This study has been prepared to contribute to filling this gap in the literature, to making decisions about foreign trade and taxes to be taken from foreign trade to more accurately determining the dynamics of the Turkish economy. The information that the study wants to provide to the literature is whether the level of trade openness and foreign trade tax revenues in Turkey have an impact on GDP. In this context, as the beginning of the period to be analyzed in the study, the period of 1993, when liberalization and outward orientation policies in Turkey began to rise, was selected. As the end period of the analysis, the last period in which data can be accessed, the 2019 period was selected. The GDP data were compiled from the World Bank, trade openness data were compiled from The Global Economy and foreign trade tax revenues were compiled from the Treasury and Finance Ministry's open data system.

The ARDL Bounds Testing Approach (or Autoregressive Distributed Lag) was used as the method in the analysis. To test the stationarity of the series, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were preferred (Dickey & Fuller, 1979; Dickey & Fuller, 1981; Phillips & Perron, 1988). In addition, since ADF and PP unit root tests do not take into account the possibility of breaking in time series, Zivot and Andrews unit root tests were also performed (Zivot and Andrews, 1992). Finally, CUSUM and CUSUMQ methods were used to determine whether there was a structural break in the model used (Brown et al., 1975).

According to the results of the analyses, there is a statistically significant and negative relationship between foreign trade tax revenues and GDP in Turkey. But the level of impact of this relationship is quite low. An increase in foreign trade tax revenues over a long period leads to a very low decrease in GDP. It is believed that this negative effect of foreign trade tax revenues on GDP in the long term is because some of the imported goods decommissioned are intermediate goods and raw materials used in domestic production. It is estimated that increased costs by taxation of these goods negatively affect domestic production.

When we look at trade openness, another variable examined in the analysis, it is seen that there is a statistically significant relationship with GDP. However, this time it is understood that the relationship is positive, not negative. In other words, an increase of one unit in trade openness in the long term also creates an increasing effect on GDP. Similar to the above, this result is thought to be due to imported goods, as well as the increasing export trend. Namely, the import of raw materials and intermediate goods required for domestic production is positively affected by trade openness, in other words, the import of these mentioned ones is facilitated. This situation has a positive effect on GDP by facilitating the supply of inputs used in domestic production and increasing their alternatives. Similarly, an increased export trend in Turkey is effectively fed through the opening to foreign trade. Increasing foreign trade trend as a result of economic integration movements contributes to the increase of exports and encourages the increase of domestic production, which has a positive effect on GDP.

Finally, as a result of this study, it can be said that additional tax obligations imposed on foreign trade to increase tax revenues in Turkey negatively affect economic growth, while the opening of the use of economic instruments to foreign investors and consumers positively affects economic growth.

Keywords: Fiscal policy, trade openness, foreign trade tax revenues, economic growth, ARDL bound test, public finance, economy

Öz: Ticari dışa açıklık seviyesi ve dış ticaretten alınan vergilerin GSYH üzerindeki etkisi literatürde sıklıkla tartışılan konulardan birisidir. Özellikle küreselleşme ve ekonomik bütünleşme hareketleri ile birlikte ülkelerin dış ticareti ile ilgili bu faktörlerin analiz edilmesi elzem önem arz eden ve araştırmacılar arasında ilgi çeken bir konu olmuştur. Ancak bu iki faktörün ekonomik büyümeyi ne boyutta ve ne yönde etkileyeceğine yönelik kabul görmüş genel bir kanı bulunmamaktadır. Literatürdeki bu fikir birliğinin eksikliğinin temelinde dışa açıklık seviyesi ve dış ticaretten alınan vergilerin büyüklüğünün ülkeden ülkeye değişmesi yer almaktadır. Bu çalışmada bu etki Türkiye kapsamında incelenmiştir. Analizde ticari dışa açıklığın seviyesi olarak genel kabul görmüş olan $[(\text{İhracat} + \text{İthalat}) / \text{GSYH}]$ formülü kullanılmıştır. Türkiye’de bu etkinin büyüklüğünü ve yönünü belirlemek suretiyle çalışmanın; literatüre, dış ticaret ile ilgili alınacak kararlara ve gelecekteki araştırmacılara katkı sağlaması amaçlanmaktadır. 1993-2019 dönemi için gerçekleştirilen çalışmada, ARDL Sınır Testi Yöntemi kullanılmıştır. Analizin sonucunda Türkiye’de dış ticaretten elde edilen vergi gelirlerinden GSYH’ye yönelik düşük seviyede ve negatif bir ilişki tespit edilmiştir. Diğer yandan, ticari açıklık seviyesinden GSYH’ye yönelik pozitif ve anlamlı bir ilişki tespit edilmiştir. Bu tespitler Türkiye’de vergi gelirlerini artırmak amacıyla dış ticarete getirilen ek vergisel yükümlülüklerin büyümeyi olumsuz etkilediğini, ekonomik enstrümanların kullanımının dış yatırımcılara ve tüketicilere açılmasının ise ekonomik büyümeyi olumlu etkilediğini göstermektedir.

Anahtar Kelimeler: Maliye politikası, ticari açıklık, dış ticaret vergi gelirleri, ekonomik büyüme, ARDL sınır testi, kamu maliyesi, iktisat

Introduction

Tax revenues are one of the important sources of income in the budgets of countries. It is quite possible to use these revenues in a way that supports increasing GDP with the right policies applied. In countries with an open economy and realizing significant exports and imports, the share of foreign trade taxes in the total tax revenues is undeniable. In other words, it can be said that taxes levied on foreign trade affect GDP in today's open economies. Whether this effect is positive or negative is a matter frequently discussed and analyzed. Of course, this effect depends on the tax policy applied. For example, increasing the taxes collected from foreign trade to increase tax revenues may adversely affect the GDP by increasing the cost of raw materials and intermediate goods required for domestic production.

Another issue that is accepted to have an impact on the GDP of countries, as well as taxes on foreign trade, is the issue of trade openness. Trade openness, which shows the freedom or strictness of countries in their commercial relations with the outside world, may have positive or negative effects on GDP depending on export and import items.

The aim of this study is to contribute to the literature by determining whether trade openness in Turkey and foreign trade tax revenues have an impact on GDP. Naturally, another aim of the study is to indicate the direction and magnitude of the effect, if such an effect exists. It is aimed to contribute to the literature by determining whether this relationship exists or not. Because in countries such as Turkey, where both export and import factors are at an important level, it is important to know the impact of both taxes on these factors and these factors on GDP.

In the first part of the study, information about the taxes collected from foreign trade is given and the composition of the revenues obtained from these taxes and their share in total tax revenues are shown in the figures. Then, the concept of trade openness summarized and Turkey's

trade openness levels are shown in the Figure 6. Besides, Figure 7 is given in place for Turkey's GDP in the same section. Finally, after the literature review, the econometric analysis section is started.

The method of analysis performed for the period 1993-2019 is The ARDL Bounds Testing Approach (or Autoregressive Distributed Lag). In order to test the stationarity of the series, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were preferred (Dickey & Fuller, 1979; Dickey & Fuller, 1981; Phillips & Perron, 1988). In addition, since ADF and PP unit root tests do not take into account the possibility of breaking in time series, Zivot and Andrews unit root tests were also performed (Zivot & Andrews, 1992). Finally, CUSUM and CUSUMQ methods were used to determine whether there was a structural break in the model used (Brown et al., 1975).

Taxation of Foreign Trade

Along with factors such as globalization, digitalization, economic integration and liberalization, the share of foreign trade taxes in Turkey's tax revenues is very important. (Kolçak, 2013, p. 207). Also, foreign trade taxes are used as a tool in international political issues. The increasing international trade, especially today, makes foreign trade taxes more valuable. To look at this issue in terms of Turkey, total tax revenues and foreign trade tax revenues in Turkey are shown in the following figure.

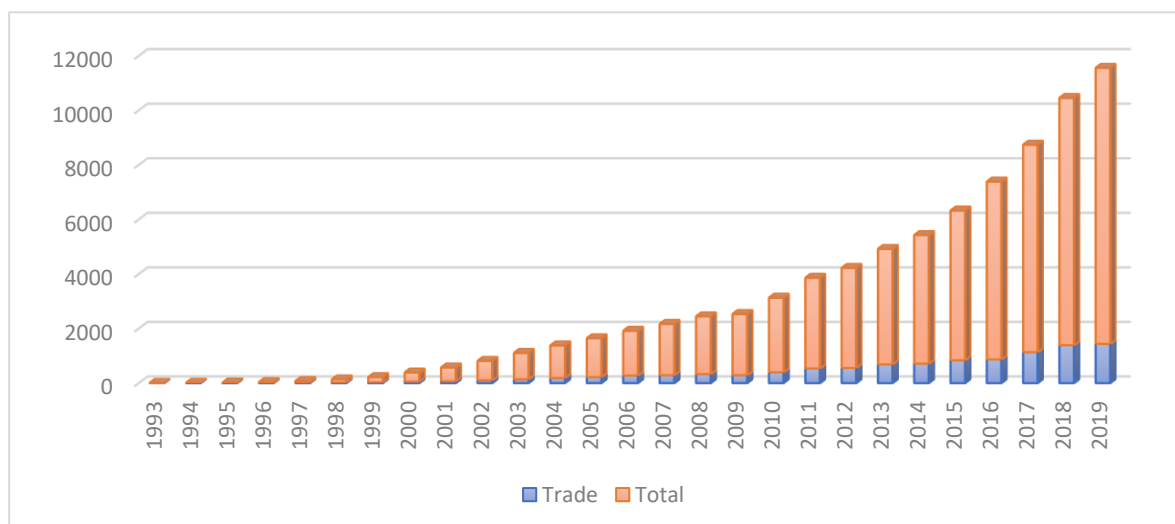


Figure 1: Foreign Trade Tax Revenues and Total Tax Revenues in Turkey for 1993-2019 Period (Million TL) **Source:** General Directorate of Accounts - Ministry of Treasury and Finance

Note 1: The figures are gross and include refuses and refunds, shares given to local administrations and amounts transferred to funds.

Note 2: The amount of minimum living deduction is included in the income tax incentive figure in tax income for the years 2008-2020.

As can be seen from Figure 1, except for the year 2009¹, Turkey realized a significant increase in total tax revenues each period with a significant share of foreign trade tax revenues. Considering the effect of tax revenues on GDP, it is a question of where the foreign trade tax revenues are in this effect. The answer to be given to this question constitutes one of the two main purposes of this study. At this point, it is also important to know the composition of the foreign trade taxes.

¹ Due to the economic developments that emerged in the last months of 2008 and adversely affected many countries.

Customs Duty

Customs duty, which has a history of at least as much as special consumption taxes, are taxes levied on imported or exported goods, depending on the situation, and can be collected based on value or physical amount. (Pehlivan, 2006, p. 407; Tokatlıoğlu, 2005, p. 49).

There are many reasons why customs duty is charged both historically and in modern states. Of course, it can be easily said that, as in all other taxes, one of the main purposes of the customs duty is to provide income to the state budget. In addition to this, the desire to protect domestic production (Çelik, 1999, p. 124), to reduce the use of luxury consumption goods (Demircan, 2003, p. 111), to eliminate the imbalances of payments (Kolçak, 2013, p. 191), etc. can also be given as examples. Moreover, since customs duty has the opportunity to be applied more easily compared to other indirect taxes, it also enables indirect taxation to achieve its purpose (Kolçak, 2013, p. 196).

Although customs duties have many advantages, it has been observed that their share in tax revenues of countries has recently decreased. The main reason for this situation is thought to be globalization, digitalization and various international economic integration movements. In fact, it is seen that some international institutions and organizations, which are the pioneers of these international economic integration movements, set rules that all member countries must comply with for customs duties. Such regulations lead to a decrease in the rate of increase in customs duty revenues of countries. A similar situation is also seen in Turkey. Turkey's custom duty revenues is shown in the table below.

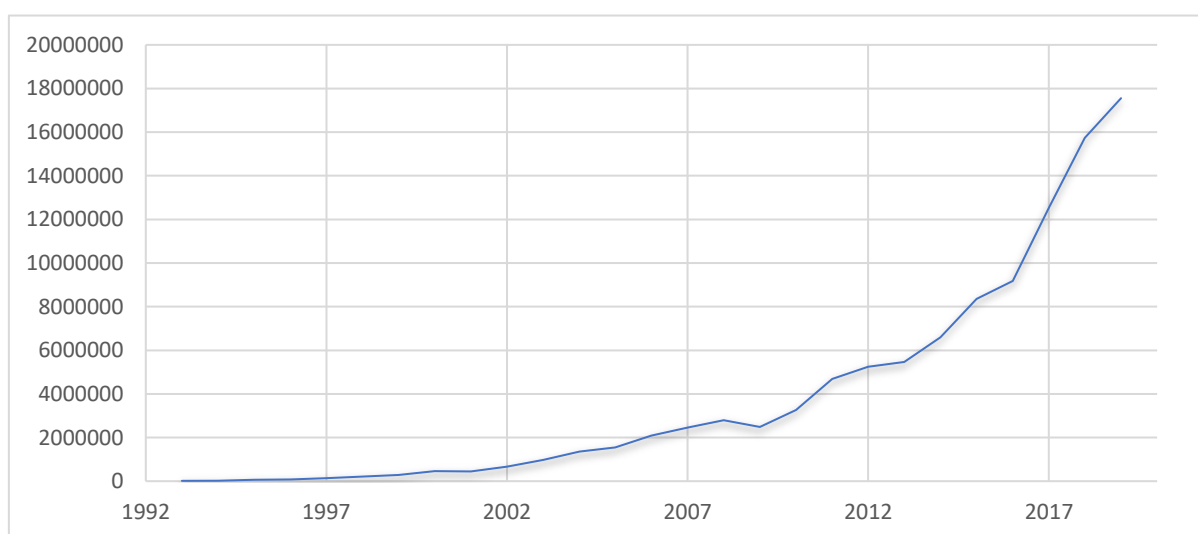


Figure 2: Customs Duty Revenue in Turkey for 1993-2019 Period (Thousand TL) **Source:** General Directorate of Accounts - Ministry of Treasury and Finance

Note 1: The figures are gross and include refuses and refunds, shares given to local administrations and amounts transferred to funds.

As can be seen from Figure 2, Turkey has experienced an increase in revenue of the customs duty for every period, except 2009. This situation has started to show itself more effectively, especially since the 2000s, with globalization and economic integration becoming more evident. The following figure shows the share of customs duty revenues in foreign trade tax revenues and total tax revenues in Turkey.

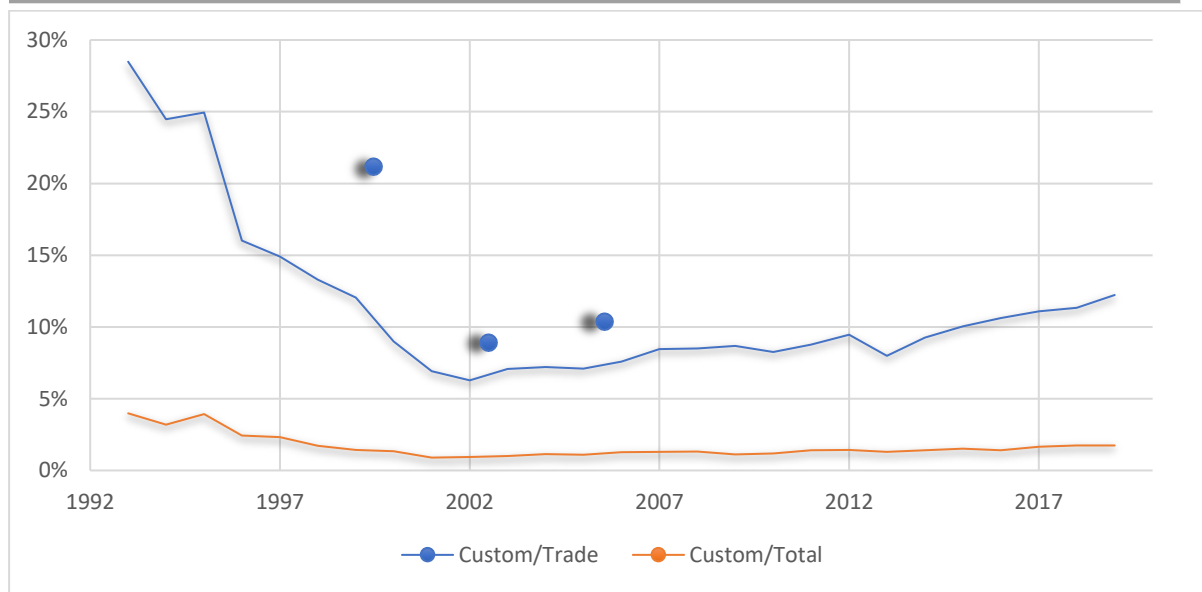


Figure 3: Customs Duty Revenues in Foreign Trade and Total Tax Revenues for 1993-2019 Period(%) **Source:** General Directorate of Accounts - Ministry of Treasury and Finance

Note 1: The figures are gross and include refuses and refunds, shares given to local administrations and amounts transferred to funds.

Note 2: The amount of minimum living deduction is included in the income tax incentive figure in tax income for the years 2008-2020.

As can be seen from Figure 3, the share of customs duty revenues in foreign trade tax revenues showed a significant decline in Turkey since 1996. The main reason for this situation is thought to be the EU Customs Union Agreement mentioned earlier. However, it is observed that this situation has started to change since 2013 and the share of customs duty revenues in foreign trade tax revenues is in an increasing trend.

The decrease in the share of customs duty revenues in foreign trade tax revenues brings to mind the question of which tax is filled this lost share. In Turkey, for various reasons mentioned earlier, it is the import VAT that compensates the lost revenues of the customs duty.

Import VAT

Nowadays, due to globalization and various international agreements that countries have participated in, the efficiency of use of customs duty in foreign trade policies and its share in tax revenues tends to decrease. Because of this situation, both other modern countries and Turkey are turning to apply co-effective taxes² along with customs duties (Tokatlıoğlu, 2005, p. 50; Kolçak, 2013, p. 200). Currently, the most important tax that is applied in Turkey and can be qualified as equivalent to customs duty is import VAT.

In accordance with the regulation in Article 1 of the Value Added Tax Law No. 3065, all kinds of goods and services import are subject to VAT. In the simplest terms, VAT charged on import transactions in line with this regulation is defined as import VAT. However, it should be noted that there is no clear provision in the VAT Law that specifies what imports of services mean (Yerci, 2005, p. 24). Essentially, it is thought that the main purpose of the clear regulation that VAT will be collected on imported goods and services in the law is to prevent the differentiation of

² Equally Effective Taxes: Unilaterally, the taxes that are applied exclusively to the goods imported from foreign countries during or after the import, unlike similar domestic goods, thus raising the price of the said goods and creating a customs tax effect on the free movement of goods (Demir, 1991: 25).

the tax burden between goods and services produced in the country and goods and services imported into the country (Kızılot, 1998, p. 22).

In addition, it may also be aimed to achieve a similar goal as in customs duties by receiving VAT on imported goods and services. By increasing the VAT rates on imports, it can be achieved to increase the price of imported goods and services and thus increase the domestic demand for domestic production. In the end, this can also effectively serve the purpose of protecting domestic production (Çelik, 1999, p. 124).

Turkey's desire to receive VAT on imports by applying to regulations in this way is due to the potential of VAT to accompany customs duties (Çelik, 1999, p. 124). Due to this potential, the import VAT qualifies as the continuation and complement of the customs duty (Kolçak, 2013, p. 198). The import VAT revenues in Turkey is shown in the figure below.

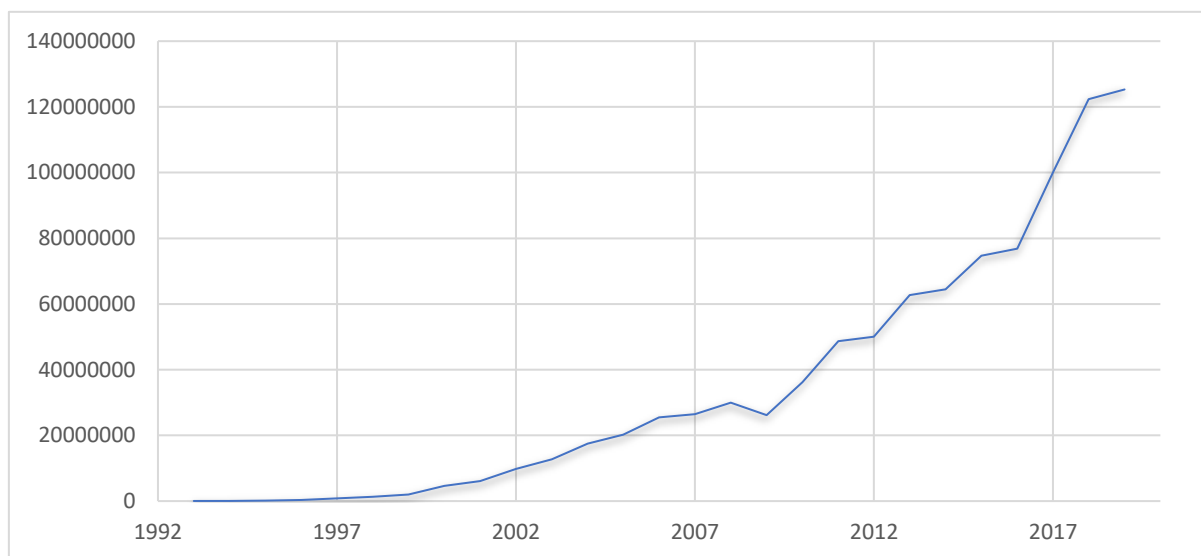


Figure 4: Import VAT Revenues for 1993-2019 Period (Thousand TL) **Source:** General Directorate of Accounts - Ministry of Treasury and Finance

Note 1: The figures are gross and include refuses and refunds, shares given to local administrations and amounts transferred to funds.

As can be seen from Figure 4, there were significant increases in import VAT revenues outside of 2009. Looking at these increases, it seems that it has gained momentum, especially with the EU customs Union Agreement. It is believed that the reason for this situation is that the customs duty revenues deprived by this agreement should be compensated by the import VAT and that the previously stated tax burden should be prevented from differentiating. In the ongoing process, especially in the last 10 years, the income obtained has increased almost fivefold. This clearly shows both the impact of phenomena such as globalization and economic integration, which we feel intensely today, on Turkey's tax revenues, as well as the income potential and importance of import VAT. But in order to fully understand its importance, it is necessary to examine the share of import VAT in the foreign trade tax revenues and the total tax revenues. In this context, these shares are shown in the figure below.

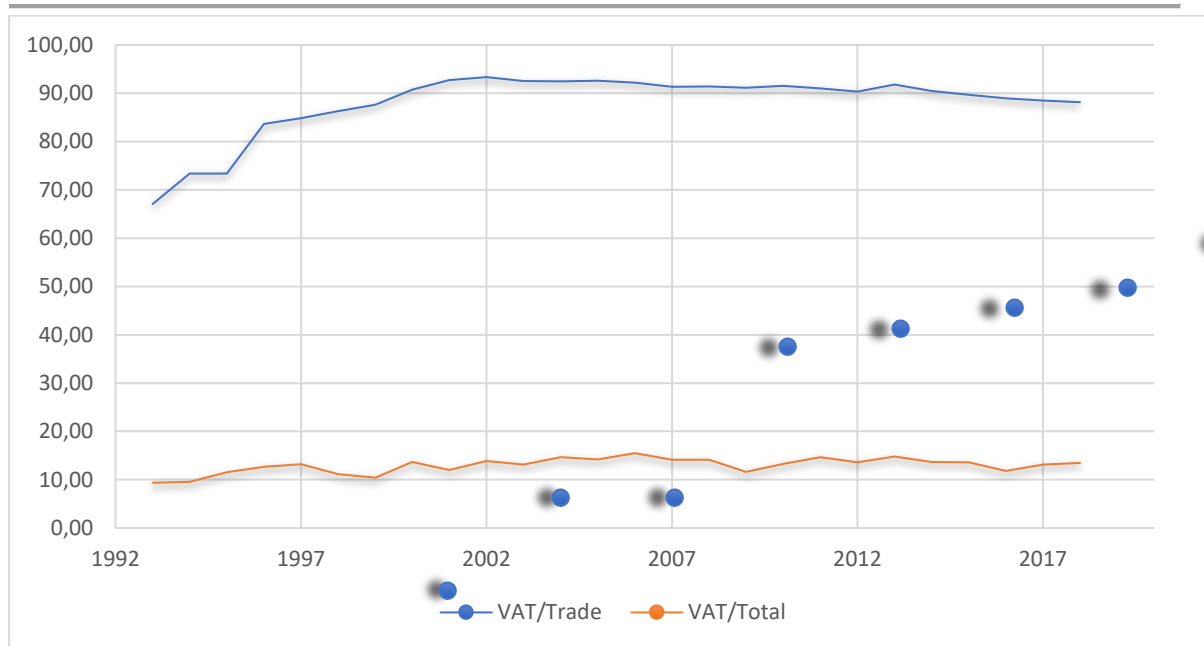


Figure 5: Import VAT Revenues in Foreign Trade and Total Tax Revenues for 1993-2019 Period (%) **Source:** General Directorate of Accounts - Ministry of Treasury and Finance

Note 1: The figures are gross and include refuses and refunds, shares given to local administrations and amounts transferred to funds.

Note 2: The amount of minimum living deduction is included in the income tax incentive figure in tax income for the years 2008-2020.

As can be seen from Figure 5, the share of import VAT in total tax revenues is between 10-15% and remains important over the years. Looking at its share of foreign trade tax revenues, it seems that it remains at 90%, especially after the EU Customs Union Agreement. This shows that a very large part of the foreign trade tax revenues consists of import VAT. Given what is happening in the international economic conjuncture today, it is common for customs duties to be replaced by import VAT in this way.

Trade Openness

Within the scope of this study, another issue included in the analysis together with GDP is trade openness. Trade openness is regarded as a reflection or result of trade liberalization as an indicator of the extent to which countries implement free or strict policies in their commercial relations with the outside world. In other words, trade openness is a concept used to explain the level of integration of countries with other countries along with the globalization process or which one of the open economy policies is more widely implemented (Saçık, 2009, p. 526).

The method for calculating trade openness level in a country is $(\text{Export} + \text{Import}) / \text{GDP}$. This calculation method will be used in this study. Turkey's trade openness level by this method is shown in the Figure below.

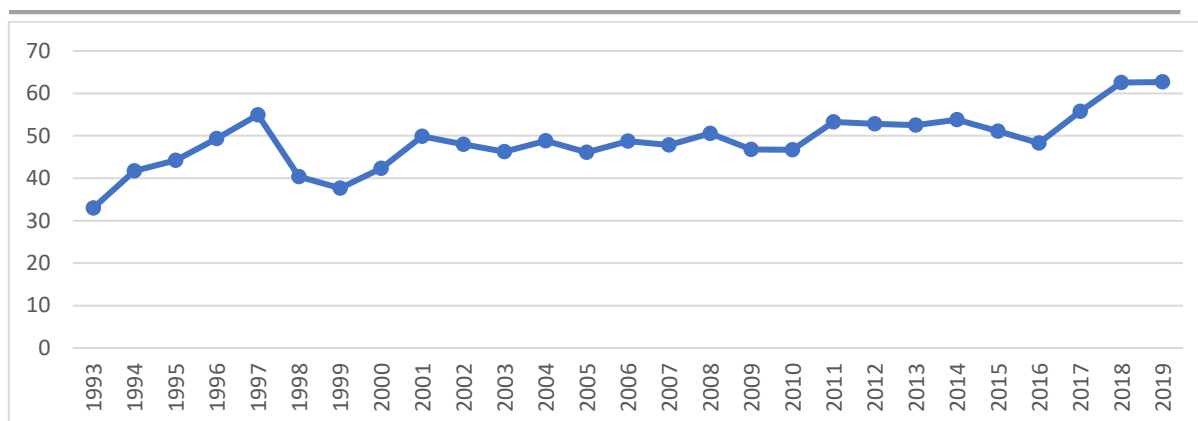


Figure 6: Turkey's Trade Openness for 1993-2019 Period

Source: https://www.theglobaleconomy.com/rankings/trade_openness/Europe/#Turkey, Date of Access: 10/02/2021.

As can be seen from Figure 6, Turkey's trade openness level has almost doubled in 27 years. Considering that the GDP contained in the denominator of the formula used in the calculation in the same process has increased by about five times, it can be said that Turkey's import and export volume has increased significantly. In other words, the level of trade openness to foreign affairs has increased. But although Turkey has seen an increase in the level of trade openness, compared to other developed and developing economies, Turkey seems to rank very low. Although it has changed over the years, in the ranking of about 40-45 countries, Turkey is in the last five countries almost every period.

Finally, another issue to be analyzed within the scope of the study is GDP. Although it is not preferred to be explained under a separate title in the study because it is a known concept in the literature, Turkey's GDP variation over the years is shown in the figure below in order to protect the integrity of the meaning of the study.

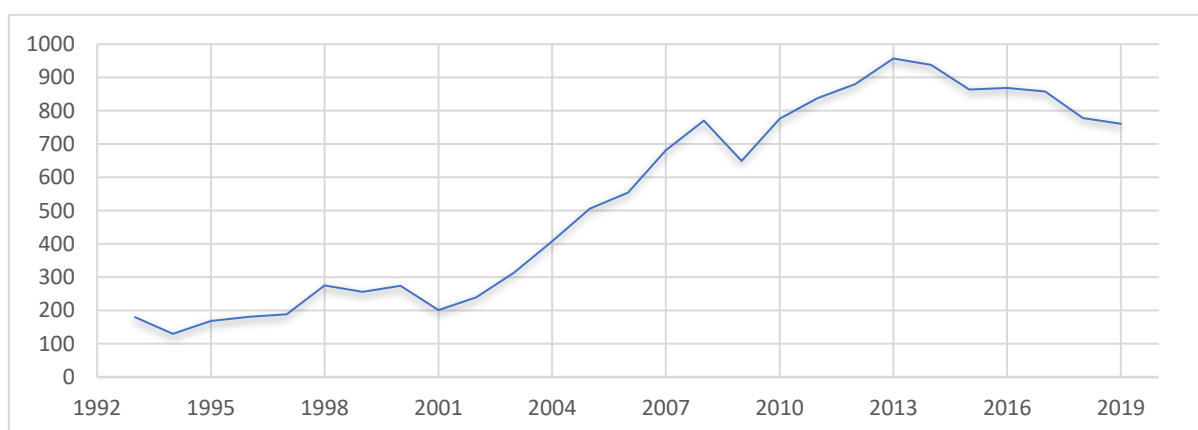


Figure 7: Turkey's GDP for 1993-2019 Period (Billion Dollars) **Source:** <https://data.worldbank.org/country/turkey?locale=tr>

Literature Review

Looking at the literature related to this study, it seems that no study examines the impact of FTTR (Foreign Trade Tax Revenues) and TO (Trade Openness) on GDP at the same time. Instead, the researchers examined the effects of FTTR and TO on GDP in separate studies. The basic examples that can be given to such studies are below.

Dar and Amirkhalkhalı (2003) tested the relationship between export growth and economic growth with data covering the 1971-1999 period for 19 OECD countries. Countries are divided into three parts according to the degree of openness ($\text{Export} + \text{Import} / \text{GDP}$). Those with an openness coefficient between 73-126% were determined as the first group, those between 52-63% as the second group, and those between 19-44% as the third group. It was determined that the weakest effect of the increase in exports on economic growth was on the least open countries and the most on the middle group countries.

Taban and Aktar (2008) examined the validity of the export-based growth hypothesis in Turkey between 1980:01-2007:02 using quarterly data. According to the results of the study, a mutually causal relationship was found between the growth in exports in Turkey and the growth in real GDP in the short and long term.

Alagöz (2009) examined the relationship between GDP and foreign trade in Turkey between 1980 and 2006 within the framework of internal growth theory. According to the results of the study, it was found that there is a unilateral causal relationship from foreign trade to GDP.

Zaman (2012) was analyzed the relationship between international trade, environmental problems and GDP for Bangladesh using Johansen's Cointegrating Methods and Granger Causality Test. The results of the analysis indicate a bidirectional causal link between trade openness and GDP per capita but no causal link has been found from trade openness to CO2 emissions and from GDP per capita to CO2 emissions in both short-run and long-run.

Huang and Chang (2013) were analyzed the relationship between trade openness and GDP for 46 countries for the period of 1983-2007. They used both linear and nonlinear econometric models and found that in countries with higher stock market development trade openness enhances GDP more.

Sikwila, Ruvimbo and Mosikari (2014) were analyzed the relationship between trade openness and GDP for South Africa for the period of 1994-2013 with quarterly data. They used regression analysis and found that there was an enormously long and short-term influence of trade openness on GDP.

In their study, Yavuz and Beşel (2015) were analyzed the relationship between taxes on foreign trade and economic growth in Turkey for the period 1960-2012. Toda-Yamamoto causality analysis and frequency causality analysis were used in the study. As a result of the Toda-Yamamoto causality analysis, it was determined that there was no relationship between the variables. And as a result of the Frequency Causality Analysis, it was determined that there is a one-way and temporary causality from economic growth to foreign trade tax revenues.

Keho (2017) examined the impact of trade openness on economic growth for Ivory Coast over the period 1965–2014 in a multivariate framework. Keho used the Autoregressive Distributed Lag Bounds Test and the Toda and Yamamoto Granger Causality Tests. The results show that trade openness has positive effects on GDP both in the short and long term.

Data Set And Methodology

With this study, it is aimed to determine the relationship between trade openness and economic growth in Turkey. In the analysis carried out within the scope of the study, annual data for the years 1993-2019 were used. The GDP data were compiled from the World Bank, trade openness data were compiled from The Global Economy and foreign trade tax revenues were compiled from the Treasury and Finance Ministry's open data system. The data set and its abbreviations used in the study are shown in Table 1.

Table 1: Variables and Abbreviations

Variables	Abbreviations	Type
Gross Domestic Product	GDP	Dependent Variable
Trade Openness	TO	Independent Variable
Foreign Trade Tax Revenues	FTTR	Independent Variable

In this study, the cointegration relationship was tested using the "ARDL Bounds Testing Approach " (or Autoregressive Distributed Lag) proposed by Pesaran and Shin in 1997 and developed by Pesaran, Shin and Smith in 2001 (Pesaran et al., 2001, p. 289-326).

The ARDL basically consists of three stages. In the first step, it is tested whether there is a long-term relationship between the variables included in the analysis. If there is a cointegration relationship between these variables, long and short-term elasticities are obtained, respectively, in the following stages (Narayan & Smyth, 2006, p. 337).

In this context, descriptive statistics are presented in the following sections of the study. Then the results of unit root tests are given. After unit root tests, the ARDL model was established and the results were interpreted. Analyzes were carried out with EViews 10.0 package program.

Descriptive Statistics

The results of the descriptive analysis and distribution tests performed on the variables are summarized in the table below. The columns of the table show the variables, while the rows show descriptive statistics.

Table 2: Descriptive Statistics

	LNGDP	FTTR	TRADE OPEN
Average	26.82081	39014187	48.75148
Median	27.04597	27579815	48.76000
Maximum	27.58790	143584908	62.68000
Minimum	25.59610	53932	33.02000
Standard Deviation	0.668514	42925233	6.600648
Jarque-Bera	2.986640	5.834387	0.264066
Probability	0.224626	0.054085	0.876312
Observations	27	27	27

ADF and PP Unit Root Tests

In the model to be predicted, the variables must not contain unit roots, they must be stationary. If the variables contain unit roots, the values obtained from the t statistics will not be valid (Bewley, 1979; Keskin & Kara, 2021, p. 10). In the ARDL test, the series do not need to be stationary at the same level. If any of the series is stationary at the second difference, the ARDL model cannot be used (Çelik, et al., 2021, p. 12) Accordingly, the stationarities of the variables in the study were tested using Augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) unit root tests. Test results are given in the table below.

Table 3: Unit Root Tests Results

	PP (Level)			PP (1. Dif.)		
	GDP	FTTR	TO	GDP	FTTR	TO
With Constant	-1.1155	10.7074	-2.4698	-5.6478	-3.4776	-8.5034
Probability Value	0.694	1.00000	0.134	0.0001***	0.0175**	0.0000***
With Constant & Trend	-12.283	15.008	-34.525	-6.2149	-5.3232	-10.0912
Probability Value	0.8831	1.0000	0.0662*	0.0002***	0.0012***	0.000***
Without Constant & Trend	1.6869	10.1755	1.8154	-4.8946	-2.4325	-5.6661
t-Statistic Prob.	0.9744	0.0000***	0.9803	0.0000***	0.0173**	0.0000***
	ADF (Level)			ADF (1. Dif)		
	GDP	FTTR	TO	GDP	FTTR	TO
With Constant	-1.1155	3.5649	-2.4228	-5.7090	-3.5126	-4.8574
Probability Value	0.694	1.0000	0.1455	0.0001***	0.0161**	0.0007***
With Constant & Trend	-1.1952	0.281	-4.3883	-6.2149	-5.2709	-3.9937
Probability Value	0.8906	0.9974	0.0097**	0.0002***	***0.0014	0.0267**
Without Constant & Trend	1.6364	5.7464	0.8797	-4.8808	-2.5434	-4.7086
t-Statistic Prob.	0.9718	1.0000	0.893	0.0000***	0.0133**	0.0000***

(*) %10 significance level, (**) %5 significance level, (***) %1 significance level.

Note: Levels are looked at according to MacKinnon (1996).

According to the PP test result, only the TO is stationary at the level of 10% in the model with constant and trend. For the PP test, all variables are stationary in all models on the first difference. According to the ADF test results, only the TO is stationary at 1% level in the model with constant and trend. The first difference of the ADF test is that all series are stationary for all models.

Zivot and Andrews Unit Root Test

The ADF and PP unit root tests used to test the stationarity in the study do not consider the possibility of breakage in time series. For this reason, Zivot and Andrews (1992) unit root test will be applied to the study in addition to ADF and PP unit root tests. Zivot and Andrews unit root test results are presented in the table below.

Table 4: Zivot and Andrews Unit Root Test Results

Variables	With Constant (Level)		With Constant + Trend (Level)	
	Constant Model	Constant Model Breaking Period	Constant + Trend Model	Constant + Trend Model Breaking Period
GDP	-2.761871	2004	-3.608483	2012
FTTR	-1.050445	2015	-2.719098	2009
TO	-4.813886**	2015	-4.980871**	2002

Variables	Constant Model (1. Dif.)		Constant + Trend Model (1. Dif.)	
	Constant Model	Constant Model Breaking Period	Constant + Trend Model	Constant + Trend Model Breaking Period
GDP	-8.668438***	2003	-8.475648***	2003
FTTR	-5.519913***	2005	-5.904153**	2007
TO	-4.365458	2007	-6.777032***	2005

Critical Values	Constant Model	Constant + Trend Model
1%	-5.34	-5.57
5%	-4.93	-5.08
10%	-4.58	-4.82

(*) %10 significance level, (**) %5 significance level, (***) %1 significance level.

Note: Calculated t value <Critical value, H0 = Reject. So, there is no unit root. In another representation, in the form of absolute value; |Calculated t value|<|Critical value| H0 = Accept. So, there is a unit root.

Using the Zivot-Andrews unit root test, the structural breaks of the series were investigated by the constant model and the constant + trend model. According to the Zivot-Andrews unit root test results; In the constant model and the constant + trend model, all variables are stationary at the first difference level.

ARDL Cointegration Model

Since the stationary condition is met, the ARDL cointegration model can be applied. Cointegration analyzes are sensitive to the number of lags. The maximum number of lags in the study is determined as 4. For the lag to be suitable, there should be no autocorrelation in this lag. After the appropriate lag length was determined as 4, the ARDL model estimation was performed and the details of the model estimation are presented in the table below.

Table 5: ARDL (4,3,3) Estimate Results and Diagnostic Tests

Variable	Coefficient	Std. Error	t-Statistic	Prob
GDP (-1)	0.167908	0.291753	0.575512	0.579
GDP (-2)	0.443491	0.325088	1.364218	0.2056
GDP (-3)	0.040457	0.283995	0.142457	0.8899
GDP (-4)	-0.326263	0.202344	-1.612418	0.1413
FTTR	4.47E-09	5.58E-09	0.801424	0.4435
FTTR (-1)	-7.02E-09	6.43E-09	-1.091854	0.3033
FTTR (-2)	-9.86E-09	8.13E-09	-1.212406	0.2562
FTTR (-3)	-9.07E-09	7.67E-09	-1.18242	0.2673
TO	0.015467	0.012685	1.219302	0.2537
TO (-1)	0.021775	0.009559	2.278062	0.0487
TO (-2)	0.027113	0.012434	2.180481	0.0571

TO (-3)	0.02713	0.013248	2.047855	0.0709
Constant	1.288536	6.409261	2.010427	0.0753
Trend	0.10037	0.03533	2.840966	0.0194
R-squared	0.983837	Mean Dependent Variable		2.69942
Adjusted R-squared	0.96049	S.D. Dependent Variable		0.55909
S.E. of Regression	0.111131	Akaike Info Criterion		-1.27709
Sum Squared Residue	0.11115	Schwarz Criterion		-0.58592
Log Likelihood	2.868661	Hannan-Quinn Criterion		-1.10326
F-statistic	4.214029	Durbin-Watson Stat		1.92403
Prob (F-statistic)	0.000002			

Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test: F=1.51 (P=0.284)

Model Specification (Ramsey RESET Test) F=0.39 (P=0.539)

Normality (Jarque-Bera Test): JB=0.27 (P=0.87)

Heteroskedasticity Test: Breusch-Pagan-Godfrey: F=0.53 (P=0.849)

To evaluate the model in general terms; The R^2 and adjusted R^2 values, which show the explanatory power of the model, are quite high. When looking at the F-statistic value, it is seen that the model is significant. Durbin-Watson statistics provide a priori information that there is no autocorrelation in the model. Autocorrelation problem, changing variance, normal distribution of error terms and model error were investigated with diagnostic tests. With the Breusch Godfrey LM test, it was investigated whether there was an autocorrelation problem among the residual. The H_0 hypothesis cannot be rejected because the p-value of the test is greater than 5% significance level. In other words, error terms are not related to each other. With the Breusch-Pagan-Godfrey test, it was examined whether there was a variance problem. H_0 hypothesis could not be rejected because the p-value was greater than 5%, and it was determined that there was no heteroscedasticity problem. Model identification error tested with Ramsey Reset test. Since the p-value of the Ramsey Reset test is greater than 5% significance level, it is seen that there is no error in defining the model. In addition, the residual values obtained from the model show normal distribution. According to the results of the hypothesis tests obtained from the model, it can be said that the model obtained in this study is reliable.

After the diagnostic tests, the "ARDL Bounds Test" was applied to estimate the long-term balance relationship of the series. Results of this test are presented in the table below.

Table 6: ARDL (4,3,3) Bounds Test Results

Model	K	M	F-statistic	Importance Level	Lower Limit	Upper Limit
ARDL (4,3,3)	2	4	6.775	%10	4.577	6.188
				%5	5.55	4.675
				%1	7.97	9.413

K: Number of explanatory variables.

M: Maximum number of lags.

As a result of the ARDL Bounds Tests, the F-statistic is above the upper limit of the critical values at 5% and 10% significance levels. These results show that there is a long-term cointegration between variables in the model created. After determining the cointegration relationship between the series, first, the short term and then the long-term coefficients were calculated. The results are shown in the tables below.

Table 7: The Results of ARDL (4,3,3) Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
D (GDP (-1))	-0.157685	0.180138	-0.875357	0.4041
D (GDP (-2))	0.285806	0.19596	1.458494	0.1787
D (GDP (-3))	0.326263	0.167935	1.942789	0.0839
D (FTTR)	4.47E-09	4.30E-09	1.039166	0.3258
D (FTTR (-1))	1.89E-08	6.54E-09	2.893545	0.0178
D (FTTR (-2))	9.07E-09	5.43E-09	1.669291	0.1294
D (TO)	0.015467	0.009091	1.701359	0.1231
D (TO (-1))	-0.054243	0.013442	-4.035200	0.0029
D (TO (-2))	-0.02713	0.009275	-2.925154	0.0169
Constant	1.288536	2.716200	4.743891	0.0011
Trend	0.10037	0.023778	4.221140	0.0022
CointEq (-1)*	-0.674408	0.143665	-4.694322	0.0011
R-squared	0.791744	Mean Dependent Variable		0.0623
Adjusted R-squared	0.583488	S.D. Dependent Variable		0.1557
S.E. of Regression	0.100522	Akaike Info Criterion		-1.4510
Sum Squared Residue	0.11115	Schwarz Criterion		-0.8585
Log Likelihood	2.868661	Hannan-Quinn Criterion		-1.30201
F-statistic	3.801783	Durbin-Watson Stat		1.924038
Prob (F-statistic)	0.018157			

The cointegration coefficient is shown in the table with "CointEq (-1)". For the error correction mechanism to work, its coefficient must be statistically significant and negative. In the table above, the coefficient was found as (-0.674) and the probability value t is 0.001. The estimated error correction term is statistically significant and negative. According to these results, since the error correction coefficient is negative and significant, deviations from the short-term balance will reach the long-term equilibrium after $1/0.67 = 1.48$ years.

Table 8: ARDL (4,3,3) Long-Term Coefficients

The Dependent Variable (GDP)	Coefficient	Standard Deviation	t-statistics	Possibility
FTTR	-0.0000000319	0.0000000122	-2.602	0.028**
TO	0.135653	0.084	2.763	0.055**

(*) %10 significance level, (**) %5 significance level.

When ARDL long-term coefficients are examined, all variables in the model are statistically significant. It is seen that there is a statistically significant and negative relationship between GDP and FTTR. In the long run, one unit increase in FTTR causes a decrease in GDP. It is seen that there is a statistically significant and positive relationship between GDP and TO.

CUSUM and CUSUMQ

CUSUM and CUSUMQ method was used to determine whether there was a structural break in the model. CUSUM and CUSUMQ is a method developed by Brown, Durbin and Evans. (1975) and determines whether there is a structural break in the model. If there are structural breaks, it is expected to eliminate the fracture by creating dummy variables. CUSUM and CUSUMQ figures are shown in the figure below.

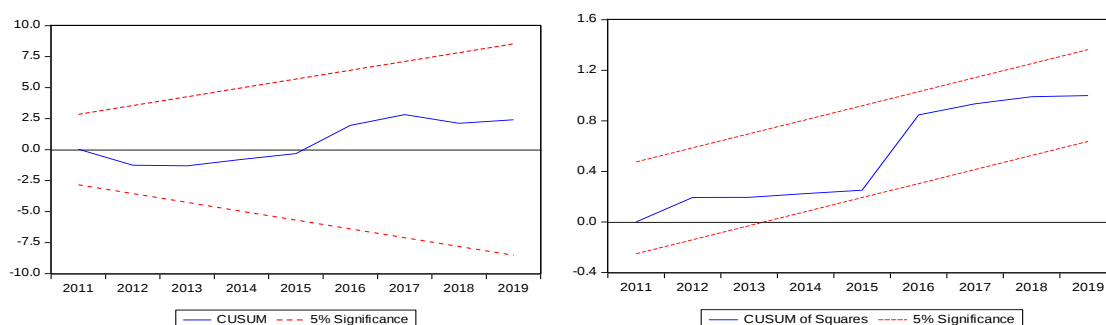


Figure 8: CUSUM and CUSUMQ Tests Results

If the CUSUM and CUSUMQ figures are within the critical limits at the 5% significance level, it is decided that the long-term coefficients are consistent. As can be seen in the figure, CUSUM and CUSUMQ did not exceed the critical limits. It is possible to express the long-term coefficients consistently.

Conclusion

Today, increasing globalization, digitalization, economic integration, etc. movements greatly increase the impact of foreign trade on the economies of countries. This effect of global trade on the economy of countries brings to mind the question of what the impact of taxation of this trade is. As a matter of fact, this study was carried out in search of answers to this question.

In the study, it was measured whether Turkey's trade openness in 1993-2019 and tax revenues from foreign trade had an impact on GDP. As a result of the study, significant statistical relationships were determined for both variables. Analyses were also carried out for the validity of these relationships, and the consistency of the method used in the study and the result found was also determined.

According to the results obtained from the analyses, there is a statistically significant and negative relationship between FTTR and GDP in Turkey. But the level of impact of this relationship is quite low. An increase in FTTR over a long period leads to a very low decrease in GDP. It is believed that this negative effect of FTTR on GDP in the long term is because some of the imported goods decommissioned are intermediate goods and raw materials used in domestic production. It is estimated that increased costs by taxation of these goods negatively affect domestic production.

When we look at TO, another variable examined in the analysis, it is seen that there is a statistically significant relationship with GDP. However, this time it is understood that the relationship is positive, not negative. In other words, an increase of one unit in TO in the long term also creates an increasing effect on GDP. Similar to the above, this result is thought to be due to imported goods, as well as the increasing export trend. Namely, the import of raw materials and

intermediate goods required for domestic production is positively affected by trade openness, in other words, the import of these mentioned ones is facilitated. This situation has a positive effect on GDP by facilitating the supply of inputs used in domestic production and increasing their alternatives. Similarly, increased export trend in Turkey is effectively fed through the opening to foreign trade. Increasing foreign trade trend as a result of economic integration movements contributes to the increase of exports and encourages the increase of domestic production, which has a positive effect on GDP.

As a result of this study, it can be said that additional tax obligations imposed on foreign trade in order to increase tax revenues in Turkey negatively affect economic growth, while the opening of the use of economic instruments to foreign investors and consumers positively affects economic growth.

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