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THE EXAMINATION OF THE RELATIONSHIP BETWEEN FOREIGN DIRECT INVESTMENT AND TRADE IN TURKEY: ARDL APPROACH

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Abstract: This paper is aimed to examine the effect of Foreign Direct Investment inflow on Trade (Export, Import) in Turkey. The study copes the time span from 2006 Q2 to 2019 Q4. The time series datasets, those are retrieved from CBT and FRED database are used in applied econometrical methods such as ADF, PP, Zivot Andrews Unit Root Tests, ARDL bounds testing approach, and the Granger Causality tests, to accomplish the statistical part of the research. Based on the findings, it was supported that there was a positive relationship between FDI and Trade. Additionally, the outputs of Granger causality test indicated that there is a unidirectional causality running from FDI to Trade (Export and Import).

Keywords: FDI; Trade; Turkey; Unit root tests; ARDL bounds testing approach; Granger causality test.

JEL codes: B22; B27; C01.

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1. Introduction

Foreign Direct Investment has become a key factor for the operation of the present global economy with globalization processes and the focus of an extensive investigation by academics and multinational businesses. Foreign Direct Investment is one of emerging economies' major engines, bringing cash, technology, new management, etc., to recipient nations. With the growth in capital movements in the international market, foreign capital begins to produce in any country where investments will be more appropriate. Countries consider FDI inflows as a means of financing for current account imbalances to support development and growth and thus prioritize measures to enhance FDI inflows. Foreign direct investment, which offers the buildup of the nation's wealth where it is directed, initiates competitiveness with technical progress and knowledge management, generates jobs, and improves export prospects. It also makes a substantial contribution to resolving nations' balance of payments imbalances, economic progress, and prosperity. Therefore, foreign direct investment is one essential factor that must be assessed, particularly for developing nations.

They also have specific detrimental ramifications on the economy of the hosting nation in contrast to their economic benefits. In general, major international firms make foreign direct investments, and the competitive dominance of big firms generates an economic monopoly, and it might be a challenge to transmit their earnings. Foreign direct investment may lead to concerns such as more significant foreign influence over the nation's economy and the failure of indigenous enterprises to cope with foreign corporations. Nevertheless, in its beneficial impact on the economy, it would be more logical for the priority industries to provide investment inputs instead of prohibiting foreign investment under some circumstances.

The intention of the investments of the holder of foreign direct investment is the advantage of various inducements such as connectivity to raw material in foreign nations, profit from inexpensive labor, seek for alternative marketplaces, use of low-price variables, avoidance of tariff barriers and quotas, waivers of taxes, shipping expenses.

Past empirical research has shown that, based on the scale of the hosted national market, the tier of human resources, facilities, and the host nation's future prosperity, Foreign Direct Investment (FDI) could lead to desirable economic expansion, joblessness decrease, the favorable impact of these on the trading balance, advancement in human resources and entities. Therefore, theoretically, FDI is considered as a significant component that boosts economic growth (Lucas, 1998; Ramsey, 1928; Romer, 1986, 1990; Solow, 1956), and positively affects trade (Dunning, 1974, 1977, 1985, 1988), (Ethier, 1986; Ethier & Markusen, 1996; Grossman & Helpman, 2002; Helpman, 1984, 1985; Horstmann & Markusen, 1992;

Markusen, 1984, 1997, 2002; Markusen & Venables, 1998, 2000), (Moosa, 2002), (Solomon & Ingham, 1977), (Panic & Joyce, 1980), in host countries.

Turkey had many advantages that were considered factors that might easily convince investors to put capital into the Turkish economy as a host country. First, it would be great to mention about convenient geolocation of Turkey. Turkey is located in the hub of Asia and Europe, playing the role of the bridge between the two continents. The benefits of Turkey from this location are widespread and cheap transportation which is one of the crucial factors that foreign investors consider before investing in the host countries. Second, a cheap labor force is another vital factor that foreign investors consider before investing. If we compare the average wage in Turkey (285 Euro [1]) with western and eastern Europe in 2021, we can observe that the average wage in Turkey is much less than in European countries, which makes Turkey more attractive to foreign investors. Third, labor productivity is considered a crucial factor in the attraction of FDI. Based on the database of WorldBank, [2] the labor participation rate in Turkey is 66.5 % (2019) of the total population (ages 15-64), which is a relatively high statistic in that field. However, having these advantages is not that countries will be prosperous in attracting FDI into their economies. Therefore, the economic and political stability of host countries is considered another crucial factor in attracting FDI.

Now, let us take a glance at the efforts of the Turkish state in attracting FDI into the economy of Turkey. They made crucial steps to attract the attention of foreign investors to its economy. One of the essential attempts was to practice the most liberal Foreign Capital Law of the period with Law No. 6224 in 1954, introduced in 1980th (FDISCR, 2000)

The first Five-Year Development Plan of Turkey (1963-1967) was put into reality by creating the State Planning Organization (SPO) in 1960. While import substitution policy was favored throughout the mentioned time, under the heading "Incentive Measures," the question of attracting foreign capital to the private industry to achieve the specified objectives were addressed in the plan (Durgan et. al, 2016).

In the context of "Economic Stability Measures of 24 January 1980," rules on international capital have been likewise drawn up. On 25 January 1980, the Foreign Capital Framework Decree no. 8/168 came into action and was created with the State Planning Organization by the Foreign Investment Office linked to the Prime Minister (FDISCR, 2000). The General Directorate of Foreign Affairs was integrated into the undersecretaries of the Treasury and Foreign Trade under the Decree of 17.7.1991 and numbered 436. With the creation of the Under-Secretariat of Treasury and Foreign Trades by Law no. 4059 of 9 December 1999, the General Directorate of Foreign Capital maintains its functions under the undersecretaries of Treasury (FDISCR, 2000). The Framework Decisions were modified twice since 1980, in

1986 and 1992. In the subsequent time, the liberalization procedure was maintained, and with the Foreign Capital, Framework Decision numbered 95/6990 the latest legislation that led to significant amendments was implemented on 7 June 1995 (FDISCR, 2000).

The consequences of these economic liberalizations and structural changes led to the increase of foreign investment inflows into the economy of Turkey (See Graph 1).

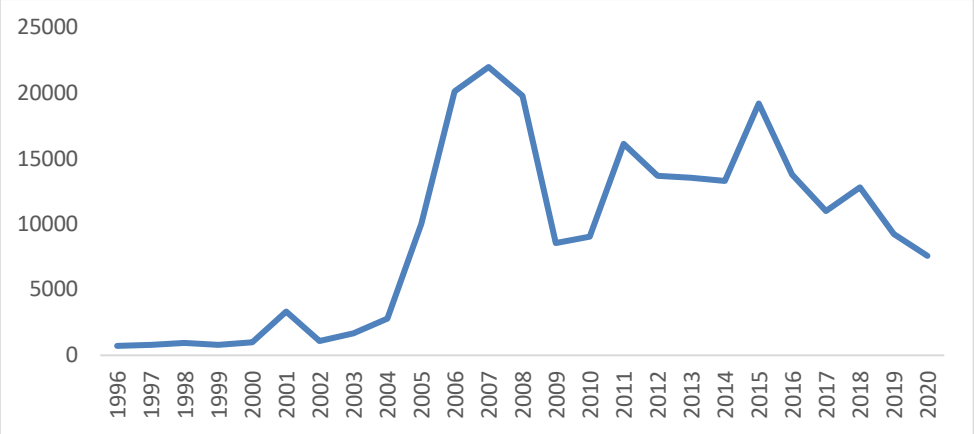
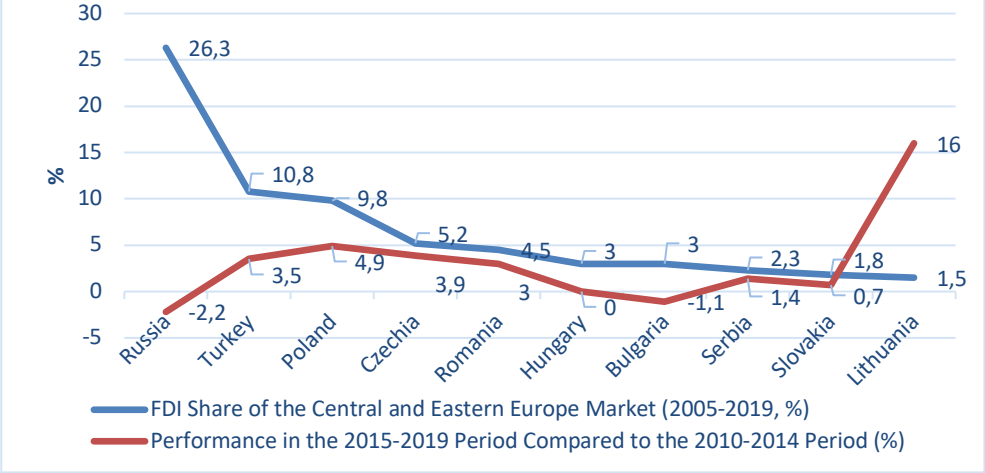


Figure 1 Foreign direct investment inflows into Turkey (mln USD)

Source: https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD, retrieved 04.02.2022.

With the establishment of political and economic stability, Turkey started to follow an open economy policy, and with these implementations, incentives have been given to foreign investors. The significant achievements with the attraction of foreign direct investment inflows have been registered after accepting Turkish candidacy for the European Union in 1999 at the Helsinki summit of the European Council (See Figure 1).

Particularly after the 2008 financial crisis, the trend of FDI inflow to developing economies has dramatically altered the worldwide FDI inflows ratio. When glancing at countries' rankings regarding FDI from 2005, Turkey's achievement in Eastern and Central Europe stands out, and Turkey was one of the top ten economies in those areas for attracting foreign direct investment [3] (See Figure 2).



(0) The FDI directed to Hungary in 2015 and 2016 is indicated as unfavorable in FDI UNCTAD records

Figure 2 Top 10 countries with the FDI performance among Central and Eastern Europe (%)

Source: Turkey FDI strategy report 2021-2023 (based on UNCTAD, WIR Annex Tables database).

These accomplishments were made possible by maximizing existing capability and emphasizing regulations that support FDI as a source of prudent finance for long-term development.

This study is aimed to analyze the relationship between foreign direct investment and trade (export and import) regarding Turkey. By considering the results and suggestions of this study the policymakers of the Turkish state will be able to solve the existing problems in the economy of Turkey and increase the amount of FDI inflows into the Turkish economy. The remainder of this paper is posited in five sections. The empirical literature review is presented in section two. Section three demonstrates the material and methods. Empirical findings and discussion are displayed in section four. The conclusion and policy recommendations are presented in section five.

2. Empirical literature review

The connection between FDI and trade has lately been a widespread issue for considerable investigation in previous studies. Karimov (2019), examined the influence of FDI inflows on the export and import of goods and services in Turkey spanning 1974 until 2017. Several analyses as the Unit Root test, the Granger Causality test, and the Johansen co-integration test have been utilized in the

statistical part of the study. According to the findings, the co-integration between trade and Foreign Direct Investment has been discovered. Therefore, outcomes of the Granger causality test indicated unidirectional causality running from Import and Export to FDI. Hence, considering his research findings, we can conclude that there is a positive impact of FDI on trade regarding Turkey. Bhasin & Kapoor (2020), investigated the impact of outward foreign direct investment from these countries on home nation exports by utilizing panel data for BRICS for the time span 1993–2015. The panel unit root tests, panel cointegration, VECM and Granger causality tests were employed for the empirical part of the paper. The findings show that OFDI has a negative and significant effect on host country exports, implying that outward FDI serves as a substitute for exports in these economies. It also shows long-run causality from exports to OFDI. There is no long-run causality between OFDI and exports. (Savićević & Kostić, 2020), examined the impact of FDI inflows on export trends in the Western Balkan countries, as well as in some Central and Eastern European countries for the time period from 2010 to 2016. The Panel regression analysis was employed for the statistical part of the study. The result has demonstrated that there is a statistically significant positive impact of FDI on the export of the Western Balkan countries. Mukhtarov et al. (2019), analyzed the impact of FDI on exports regarding Jordan for the period from 1980 to 2018. The Autoregressive Distributed Lag Bounds Testing (ARDL BT) co-integration approach was utilized in the empirical part of the research. The result demonstrated a long-term linkage between the series. The researchers obtained a positive and significant influence of FDI on export. Therefore, estimation findings show that one percent of rising in foreign direct investment growth in export by 0.13 percent. Simionescu (2014), studied the correlation between foreign direct investment and trade for G7 nations from 2002 to 2013. The Granger causality test for panel data was utilized in the empirical phase of the study. Based on the Granger causality test findings, there was a short-run causality between the analyzed series (Import, Export, and FDI). Additionally, the results of Granger causality test indicated the unidirectional long-run causality running from FDI to trade. As a result, short-run causality in both meanings was observed for Foreign Direct Investment and trade in G7 nations on the relevant timeframe. Hence, considering the results of this paper, we can conclude that there was a positive relationship between trade and FDI in G7 counties. Cetin & Seker (2013), studied the examined relationships between FDI and exports in eight developing countries from 1980 to 2009. The augmented Granger causality test has been utilized for the statistical phase of the research. The Toda-Yamamoto test findings showed a causal relationship between the series running from FDI to exports for Poland and Mexico, while the direction of causality is from exports to FDI for Pakistan and Turkey. Dolado-Lütkepohl test's results demonstrated that there was a unidirectional causality running from FDI to exports for Poland, while the direction

of causality is from exports to FDI for Pakistan and Thailand. Hence, it was confirmed that there was no bi-directional causality between series in both tests. According to their paper's empirical results, the authors suggested that developing nations must continue developing and executing export-based policies and FDI. Therefore, the developing nations' forward-looking development policies must thus cover both the export assistance policy and the FDI assistance policy. Metulini et al. (2017), analyzed the effects of FDI on trade from a network perspective. The unique data set of international corporate control is utilized to measure stock FDI to construct a corporate control network (CCN) where the nodes are the countries, and the edges are the corporate control relationships. The empirical results showed that corporate control has a positive effect on trade both directly and indirectly. The result is robust with different specifications and estimation strategies. Hence, this study's results indicated a strong indirect effect of FDI on trade. Cho (2013), analyzed the causal relationship between bilateral trade and FDI in India and East Asian countries utilizing macroeconomic data and derive policy implications for regional integration. Since the late 2000s, he has observed that Korea, Japan, and Singapore's trade and FDI with India have been rapidly rallying up, but the causal relationship between trade and FDI could not be estimated, contrary to expectations. The relationship between trade and FDI in the US, the UK, and Germany with India showed one-way or two-way causality, respectively. The analysis implies that a long-term economic exchange instead of a short-term increase might establish the causal link underlying trade and FDI.

3. Materials and Method

3.1. Data description

This study focuses on the quarterly time-series data acquired from the Federal Reserve Bank of St. Louis (FRED) and Central Bank of Turkey (CBT) for the period span from 2006 Q2 to 2019 Q4. Before converting to percentage change, all series have been adjusted to the USD in constant 2015 (CPI 2015). The Eviews-11 statistical software was employed for the empirical phase of the study.

3.2. The first model

The utilized series in empirical tests are mentioned below (See Table 1).

Table 1 Description of utilized variables in the econometric model

Variables	Abbreviation	Measurement unit	Source
Export of goods and services	EXP	Percentage change, seasonally adjusted	FRED
Foreign Direct Investment inflow (independent)	FDI	Percentage change, seasonally adjusted	CBT
Gross Domestic Product by Expenditure in Constant Prices: Total Gross Domestic Product for Turkey (explanatory)	GDP	Percentage change, seasonally adjusted	FRED

Source: Authors` own invention.

3.2.1. Model specification

Explanatory variables in the built model have been chosen according to previous studies done by researchers. Based on those series below mentioned model has been built (1):

$$EXP_t = f(FDI_t, GDP_t) \quad (1)$$

3.3. The second model

The utilized series in empirical tests are mentioned below (See Table 2):

Table 2 Description of utilized variables in the econometric model

Variables	Abbreviation	Measurement unit	Source
Import of goods and services (dependent)	IMP	Percentage change, seasonally adjusted	FRED
Foreign Direct Investment inflow (independent)	FDI	Percentage change, seasonally adjusted via E-views 11 software	CBT
Export of goods and services (explanatory)	EXP	Percentage change, seasonally adjusted	FRED

Source: Authors` own invention.

3.3.1. Model specification

Explanatory variables in the built model have been chosen according to previous studies done by researchers. Based on those series below mentioned model has been built (2):

$$IMP_t = f(FDI_t, EXP_t) \quad (2)$$

3.4. Methods

3.4.1. Augmented Dickey-Fuller Unit Root Test

The Augmented Dickey-Fuller test (ADF test), which D. David and F. Wayne (Dickey & Fuller, 1979) advanced, is a typical quantitative technique employed to determine whether or not a particular time series is stationary. When assessing the stationary of a sequence, it is one of the most often employed empirical tests. As the title implies, the ADF test is an 'augmented' variant of the Dickey-Fuller test. The ADF analysis extends the Dickey-Fuller test formula to incorporate in the framework high-order regressive processes [4].

3.4.2. Phillips–Perron Unit Root Test

The Phillips–Perron is another type of unit root test which was developed by Peter C. B. Phillips and Pierre Perron (Phillips & Perron, 1988), is a common statistical approach used to detect whether or not a time series is stationary. The H0 the PP testing is that the variable includes a unit root, and the alternative hypothesis is that the variable was formed by a stationary process. To adjust the serial correlation, the PP unit root test employs Newey–West (1987) standard errors.

3.4.3. Zivot Andrews Unit Root Test

In the presence of a structural break in the macroeconomic series, standard unit root tests like ADF and PP provide deceptive findings. Thus, in evaluating economic time series, structural shifts are critical. Economic crises, institutional changes, political upheavals, and even regime transitions can all result in structural alterations in time series (Iranmanesh & Jalaee, 2021). When a structural break is not taken into account in the time series trend, the estimation findings may be skewed toward the non-rejection of the unit root test. In order to solve this problem Eric Zivot and Donald Andrews have developed the unit root test with a single structural break in 1992 (Zivot & Andrews, 1992). The test's key characteristic is that there is no necessity to define the structural breakpoint. This analysis locates the point of structural failure and then executes the unit root test (Iranmanesh & Jalaee, 2021).

3.4.4. ARDL bounds testing approach

There are several widely applied cointegration tests that are utilized to investigate the relationship between analyzed series. For instance, the Engle-Granger and Johansen cointegration tests are one of the most widely utilized cointegration tests in practice. However, there is one serious disadvantage of these tests. The disadvantage of these tests is that all series should be stationary at level, in other words, series must be integrated of order one (I(1)). In order to solve this problem (Pesaran & Shin, 1995), (Pesaran & Smith, 1998), and (Pesaran et al., 2001) have developed the Autoregressive Distributed Lag (ARDL) bounds test approach. In the

case of the ARDL bounds test approach the utilized series might be integrated of order one I(1), order zero I(0), or might be a mix (I(1) and I(0)). Another advantage of the ARDL bounds test approach is that this method is not sensitive to the size of utilized variables, it can be applied to small samples.
The equation of the general ARDL model is as follows (3):

$$\phi(L)\, y_t = \delta + \Theta\,(L)\, x_t + u_t \tag{3}$$

where φ(L) is an order-p polynomial that, for stability, has roots lying outside the unit circle and θ(L) is an order-q polynomial [5].
The built econometric models considering the ARDL approach equation are as following (4,5):

$$\Delta \mathrm{EXP}_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta EXP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta GDP_{t-i} + \alpha_4 EXP_{t-1} + \alpha_5 FDI_{t-1} + \alpha_6 GDP_{t-1} + \varepsilon_t \tag{4}$$

$$\Delta \mathrm{IMP}_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta IMP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta EXP_{t-i} + \alpha_4 IMP_{t-1} + \alpha_5 FDI_{t-1} + \alpha_6 EXP_{t-1} + \varepsilon_t \tag{5}$$

The steps of the ARDL analysis are as follows: first, if there is a presence of the cointegration between analyzed series then long-run and short-run analysis is going to be performed. In the ARDL bounds testing approach the existence of the cointegration between analyzed series is checked via these hypothesizes (6):

$$H_0: a_1=a_2=a_3=a_4=a_5 \tag{6}$$
$$H_1: a_1\neq a_2\neq a_3\neq a_4\neq a_5$$

H_0 indicates that there is no cointegration between the analyzed series and H_a indicates that there is a cointegration between the analyzed series. In order to reject the null hypothesis and accept the alternative hypothesis that, there is a cointegration between the analyzed series the F-statistics value should be not less than the critical values of the lower bound and upper bound.

3.4.5. Granger Causality Test

The Granger causality investigates the causality among two series in a time series to see if one time series will be beneficial in forecasting another series. The approach

is a probabilistic theory of causality that finds trends of correlation in observable data sources. One advantage of time series VAR is that it allows us to evaluate 'causality' in various ways. Clive Granger was the first who suggested such an analysis among statisticians. Accordingly, the test was named the Granger causality to honor Clive Granger. It is founded on the concept that if X causes Y, then forecasting Y based on prior values of Y and prior values of X must lead to a better forecast of Y than forecasting Y based on prior values of Y alone [6].

4. Empirical findings and discussion

4.1. The results of the first model

The objective of research: To establish the effect of FDI inflows on the Tarde of Turkey

RQ: Do FDI inflows positively affect the Tarde of Turkey?

H1: Fostering Foreign Direct Investment positively affects Trade (Export and Import)

The results of the econometrical tests which were utilized in the first model are presented and discussed in this section.

4.1.2. Descriptive statistics

The descriptive statistics and correlation values of the utilized series have been described in Table 3. The correlation matrix findings indicate a not-so-strong but positive relationship between FDI and EXP, and a strong and positive relationship between GDP and EXP. The preliminary information about the relationships between series which have been gained through the descriptive statistics and correlation matrix is not enough to determine the relationship between analyzed variables. In order to get more reliable outcomes about the relationship among the analyzed series, statistical methods will be utilized in the paper.

Table 3 Descriptive statistics and correlation of the variables

	EXP	FDI	GDP
Mean	1.620071	2.415403	0.872256
Median	1.775871	2.585822	2.373952
Maximum	18.14356	41.58270	13.10307
Minimum	-19.51142	-23.88768	-22.24286
Std. Dev.	6.046521	12.67748	6.535354
Skewness	-0.153574	0.544393	-1.254966
Kurtosis	5.491040	3.797520	5.231847
Jarque-Bera	14.43663	4.174258	25.85205
Correlation			
EXP	1		
FDI	0.055158	1	

GDP	0.550121	0.514992	1

Source: Author`s own calculations.

4.1.3. The ADF and PP Unit Root Test

The specified time series might be stationary either at level or at the first difference, which is known as an advantage of the ARDL bounds testing approach. As a result, each series has been subjected to the Augmented Dickey–Fuller and Phillips–Perron unit root tests. Based on the ADF and PP test results, the null hypothesis assuming that variables have a unit root at levels must be rejected since t-statistics are greater than critical values at a five percent significance level, and series` p-values are lesser than 0.05. The null hypothesis that the series has a unit root at level must be discarded referring to the statistics. As a consequence of the ADF and PP tests findings, the investigated variables were integrated of order zero (I (0)) which means all the series are stationary at level. (See Table 4).

Table 4 The outcomes of the ADF and PP test

Variables	ADF (Intercept and trend)		PP (Intercept and trend)	
	Level	Decision	Level	Decision
EXP	-[6.350738]*** (0.0000)	I(0)	-[6.283596]*** (0.0000)	I(0)
FDI	[-7.175774]*** (0.0000)	I(0)	[-7.175774]*** (0.0000)	I(0)
GDP	[-5.061275]*** (0.0007)	I(0)	[-5.897364]*** (0.0000)	I(0)

*Note: In the ADF and PP unit root tests, the parentheses indicate p-values, brackets indicate t-statistics, and asterisks (***, **) denote statistical significance at a 1%, and 5% level respectively. The critical values for this test at 1%, and 5% significance levels are -4.14, and -3.49 respectively.*

Source: Author`s own calculations.

4.1.4. The Zivot-Andrews unit root test (structural break)

The Zivot-Andrews unit root test was employed in order to check the stationarity of the series considering one structural break. The ZA unit root test has examined the structural breaks in the analyzed series via three different models (A - intercept, B - trend, C - intercept and trend). The null hypothesis (H0) of this test states that the series has a unit root and the series is non-stationary. The alternative hypothesis (H1) of this analysis states that the series does not have a unit root and the series are stationary.

Table 5 The outcomes of the Zivot-Andrews test

Variables	ZA unit root test					
	Model A (Intercept)		Model B (Trend)		Model C (Intercept and trend)	
	t-statistic	Break year	t-statistic	Break year	t-statistic	Break year
EXP	-5.693655***	2008 Q4	-6.578393***	2009 Q1	-5.693655***	2008 Q4
FDI	-7.295840***	2010 Q4	-5.099453**	2015 Q2	-8.385223***	2009 Q2
GDP	-5.174486**	2010 Q2	-6.089854***	2009 Q1	-6.003069***	2009 Q3

*Note: The critical values for Models A and B at 1%, 5%, and 10% significance levels are -5.34, -4.93, and -4.58 respectively. The critical values for Model C at 1%, 5%, and 10% significance levels are -5.57, -5.08, and -4.82 respectively. The asterisks (***, **, *) denote statistical significance at a 1%, 5%, and 10% level respectively.*

Source: Author`s own calculations.

The results of the ZA unit root test show that the t-statistics of the model are more than critical values of 1%, 5%, and 10% significance level which means that the null hypothesis that the series has a unit root and the series are non-stationary should be rejected and the alternative hypothesis that the series does not have unit root and the series are stationary should be accepted. Thus, according to the findings of the ZA test the series are stationary with one structural break (See Table 5).

4.1.5. ARDL bounds testing approach

In comparison with other cointegration analyses, the advantage of the ARDL approach is that the series might be integrated of order zero I(0) or one I(1). In our case, all the series are integrated of order zero I(0). Thus, the next step would be to run the ARDL model. The ARDL bounds test output shows that the F value is not below the lower bounds and above the upper bounds at a 5% significance level. The null hypothesis that there is no cointegration between the analyzed series should be rejected and the alternative hypothesis that there is cointegration between the analyzed series must be accepted. Thus, based on the results of the ARDL bounds test there is a presence of cointegration between FDI, GDP, and EXP in Turkey from 2006 to 2019. Therefore, R-squared is 0.93 which means the dependent variable is explained by 93 percent. Moreover, the probability of (F-statistic) is 0.000000, which means F-statistic is significant. Additionally, the Durbin-Watson statistic is 1.898327 (close to two or slightly more is desirable). Based on the information mentioned above, it can be stated that the data fitted the model well (See Table 6).

Table 6 The results of the ARDL cointegration test

Estimated equation			$EXPR_t = f(FDI_t, GDP_t)$	
Autoselected lag structure			(1,2,2)	
Cointegration	F value	Significance	Critical values	
			lower bounds I(0)	upper bounds I(1)
Yes	4.130823	10%	2.63	3.35
		5%	3.1	3.87
		1%	4.13	5
R-squared			0.931597	
Adjusted R-squared			0.920957	
F-statistic			87.55240	
Prob(F-statistic)			0.000000	
Durbin-Watson stat			1.898327	

Source: Author`s own calculations.

4.1.6. The long-run and short-run estimation

After confirming the cointegration between the analyzed series via the ARDL cointegration test, the next step will be the estimation of the long-term and short-term coefficients. The findings which are listed in Table 6 indicate the long-term and short-term effects of the export of goods and services (EXP), foreign direct investment (FDI), and gross domestic product (GDP) in Turkey. According to the long-run analysis findings, a 1% increase in FDI, and GDP will lead to an increase in EXP by 67%, and 4% (coefficients: 0.678685, 0.040696), respectively, because all variables are statistically significant ($p < 0.05$) and coefficients are positive in sign. Based on the outputs of the short-term analysis, there is no short-run cointegration between FDI and EXP (p-value is greater than 0.05, 0.20). In another hand, there is a presence of a short-run cointegration between GDP and EXP, a 1% increase in the GDP will lead to an increase in EXP by 0.4% (coefficient: 0.004026), because GDP is significant ($p < 0.05$) and coefficients are positive in sign. Therefore, the coefficient of the error correction model CointEq(-1) is negative in sign (-0.151666) (should be not greater than 1) and statistically significant (p-value is 0.00, less than 0.05) which demonstrates that the export of goods and services (EXP) adjusts towards its long-term equilibrium at the rate of 15%. Based on the results of the long-run analysis there is a significant and positive cointegration between the analyzed series. In contradiction to long-run analysis results, the findings of the short-run analysis show negative results (See Table 7). Thus, there is no short-run cointegration between FDI and EXP (statistically insignificant ($p > 0.05$), 0.20).

Table 7 The long-run and short-run analysis

Long-run analysis			Short-run analysis		
Variable	Coefficient	T statistic and Prob.	Variable	Coefficient	T statistic and Prob.
FDI	0.678685	[4.418081]** (0.00)	D(FDI)	0.087987	[1.278815] (0.20)
GDP	0.040696	[2.451984]** (0.01)	D(GDP)	0.004026	[3.869274]** (0.00)
Constant	7.879202	[1.795952] (0.07)	CointEq(-1)	-0.151666	[-4.198195]** (0.00)

Note: In the table, the parentheses indicate p-values, brackets indicate t-statistics, and the asterisk (**) denotes statistical significance at a 5% level.

Source: Author`s own calculations.

4.1.7. Diagnostic tests

Serial correlation LM test

H_0: There is no serial correlation in the residual

Table 8 Breusch-Godfrey Serial Correlation LM Test

Statistic (χ^2)	Prob.
0.749633	0.6874

Source: Author`s own calculations.

We should accept the Null Hypothesis that there is no serial correlation in the residual, based on the p-value of the observed R-squared value (p-values >0.05; 0.68) (See Table 8).

Heteroscedasticity test

H_0: There is no heteroskedasticity in the residual

Table 9 Breusch-Pagan-Godfrey`s heteroskedasticity test

Statistic (χ^2)	Prob.
13.79850	0.0549

Source: Author`s own calculations.

We should accept the Null Hypothesis that there is no heteroskedasticity in the residual, based on the p-value of the observed r-squared value (p values >0.05; 0.054) (See Table 9).

Normality test

H_0: Residual is normally distributed

Table 10 Jarque-Bera Normality Test

Statistic (χ^2)	Prob.
0.004428	0.9977

Source: Author`s own calculations.

We should accept the Null Hypothesis that residual is normally distributed, based on the p-value of Jarque-Bera value (p-value >0.05; 0.99) (See Table 10).

Ramsey RESET test

H_0: Model is stable (correctly specified)

Table 11 Ramsey RESET test

Statistic (χ^2)	Prob.
0.684356	0.4126

Source: Author`s own calculations.

We should accept the Null Hypothesis that the model is correctly specified, based on the p-value of the F-statistic (p values > 0.05; 0.41) (See Table 11).

CUSUM stability test

In order to check the stability in the examined long-term model, the CUSUM and CUSUMSQ stability tests will be employed in the model. According to the output of the CUSUM and CUSUMSQ tests, the estimated model is steady during the relevant period (See Figure 3).

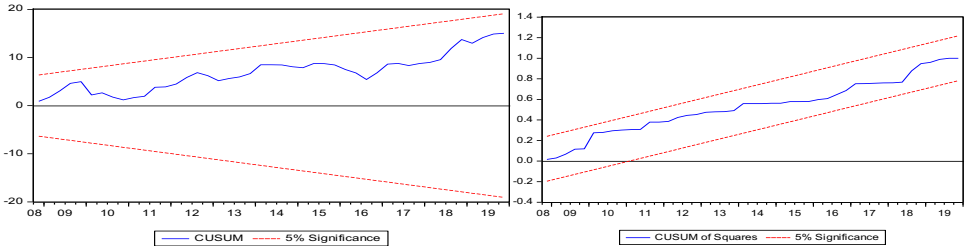


Figure 3 The CUSUM and CUSUMSQ stability tests

Source: Author`s own calculations.

4.1.8. Granger Causality test

As earlier stated, the Granger Causality analysis will also investigate the relationship between EXP and FDI. The test's null hypothesis is stated below:

H_0: FDI does not Granger Cause EXP, and

H_0: EXP does not Granger Cause FDI

When the probability value is lesser than 0.05 percent, the null hypothesis is discarded.

Table 12 Granger Causality test for FDI and EXP

Pairwise Granger causality test, Lags 2, Sample 2006 Q3-2019 Q4, Observations 52		
Null Hypothesis	**F-statistic**	**Prob.**
FDI does not Granger Cause EXP	6.36278	0.0036
EXP does not Granger Cause FDI	1.63266	0.2063

Source: Author`s own calculations.

Based on the Granger causality analysis findings, the null hypothesis of no causality between FDI and EXP must be declined predicated on a P-value=0.003 (less than 0.05). As a result, the second null hypothesis of no causal relationship from EXP to FDI must be confirmed and predicated on a P-value = 0.20 (more than 0.05). Hence, the Granger causality test findings revealed a unidirectional causality running from FDI to EXP. (See Table 12).

Overall, the findings match the literature and the premises of the study. The overview is described in-depth as obeys:

According to empirical findings, it was supported that there was a co-integration between the analyzed variables, the long-run analysis indicates a significant and positive cointegration between the FDI, GDP and EXP, the short-run analysis shows an insignificant and negative cointegration between the FDI and EXP, and a significant and positive cointegration between the GDP and EXP, and finally, the Granger causality test indicates bidirectional causality among analyzed variables. According to the obtained findings, it was supported that FDI inflows positively affects the export in Turkey.

4.2. Results of the second model

The objective of research: To establish the effect of FDI inflows on the trade of Turkey

RQ: Do FDI inflows positively affect the Trade of Turkey?

H2: Fostering Foreign Direct Investment positively affects Trade (Export and Import)

The results of statistical tests which was performed on the second model are presented and discussed in this section.

4.2.1. Descriptive statistics

The descriptive statistics and correlation values of the utilized series have been described in Table 13. The correlation matrix findings indicate a strong and positive relationship between FDI, EXP, and IMP. The preliminary information about the relationships between series which have been gained through the descriptive statistics and correlation matrix is not enough to determine the relationship between analyzed variables. In order to get more reliable outcomes about the relationship among analyzed series, statistical methods will be utilized in the study.

Table 13 Descriptive statistics and correlation of the variables

	IMP	FDI	EXP
Mean	1.279461	2.415403	1.620071
Median	1.242840	2.585822	1.775871
Maximum	17.58139	41.58270	18.14356
Minimum	-31.01304	-23.88768	-19.51142
Std. Dev.	7.899029	12.67748	6.046521
Skewness	-1.312106	0.544393	-0.153574
Kurtosis	7.100668	3.797520	5.491040
Jarque-Bera	54.31702	4.174258	14.43663
Correlation			
IMP	1		
FDI	0.332918	1	
EXP	0.743101	0.055158	1

Source: Author`s own calculations.

4.2.2. The ADF and PP Unit Root Test

The specified time series might be stationary either at level or at the first difference, which is known as an advantage of the ARDL bounds testing approach. As a result, each series has been subjected to the Augmented Dickey–Fuller and Phillips–Perron unit root tests. Based on the ADF and PP test results, the null hypothesis assuming that variables have a unit root at levels must be rejected since t-statistics are greater than critical values at a five percent significance level, and series` p-values are lesser than 0.05. The null hypothesis that the series has a unit root at level must be discarded referring to the statistics. As a consequence of the ADF and PP tests findings, the investigated variables were integrated of order zero (I (0)) which means all the series are stationary at level. (See Table 14).

Table 14 The outcomes of the ADF and PP test

ADF (Intercept and trend)			PP (Intercept and trend)	
Variables	Level	Decision	Level	Decision
IMP	[-4.748627]*** (0.0018)	I(0)	-4.507555*** (0.0000)	I(0)
FDI	[-7.175774]*** (0.0000)	I(0)	-7.175774*** (0.0000)	I(0)
EXP	[-6.350738]*** (0.0000)	I(0)	-6.283596*** (0.0000)	I(0)

Note: In the ADF and PP unit root tests, the parentheses indicate p-values, brackets indicate t-statistics, and the asterisk (***) denotes statistical significance at a 1% level.

Source: Author`s own calculations.

4.2.3. The Zivot-Andrews unit root test (structural break)

The Zivot-Andrews unit root test was employed in order to check the stationarity of the series considering one structural break. The ZA unit root test has examined the structural breaks in the analyzed series via three different models (A - intercept, B - trend, C - intercept and trend). The null hypothesis (H_0) of this test states that the series has a unit root and the series is non-stationary. The alternative hypothesis (H_1) of this analysis states that the series does not have a unit root and the series are stationary.

Table 15 The outcomes of the Zivot-Andrews test

Variables	ZA unit root test					
	Model A (Intercept)		Model B (Trend)		Model C (Intercept and trend)	
	t-statistic	Break year	t-statistic	Break year	t-statistic	Break year
IMP	-5.192504**	2009 Q2	-4.929630*	2009 Q1	-5.863969***	2009Q2
FDI	-7.295840***	2010 Q4	-5.099453**	2015 Q2	-8.385223***	2009Q2
EXP	-5.693655***	2008 Q4	-6.578393***	2009 Q1	-5.693655***	2008Q4

*Note: The critical values for Models A and B at 1%, 5%, and 10% significance levels are -5.34, -4.93, and -4.58 respectively. The critical values for Model C at 1%, 5%, and 10% significance levels are -5.57, -5.08, and -4.82 respectively. The asterisks (***, **, *) denote statistical significance at a 1%, 5%, and 10% level respectively.*

Source: Author`s own calculations.

The results of the ZA unit root test show that the t-statistics of the model are more than critical values of 1%, 5%, and 10% significance level which means that the null hypothesis that the series has a unit root and the series are non-stationary should be rejected and the alternative hypothesis that the series does not have unit root and the series are stationary should be accepted. Thus, according to the findings of the ZA test the series are stationary with one structural break (See Table 15).

4.2.4. ARDL bounds testing approach

In comparison with other cointegration analyses, the advantage of the ARDL approach is that the series might be integrated of order zero I(0) or one I(1). In our case, all the series are integrated of order zero I(0). Thus, the next step would be to run the ARDL model. The ARDL bounds test output shows that the F value is not below the lower bounds and above the upper bounds at a 1% significance level. The null hypothesis that there is no cointegration between the analyzed series should be rejected and the alternative hypothesis that there is cointegration between the analyzed series must be accepted. Thus, based on the results of the ARDL bounds test there is a presence of cointegration between FDI, EXP, and IMP in Turkey from 2006 to 2019. Therefore, R-squared is 0.72 which means the dependent variable is explained by 93 percent. Moreover, the probability of (F-statistic) is 0.000000, which means F-statistic is significant. Additionally, the Durbin-Watson statistic is 1.894519 (close to two or slightly more is desirable). Based on the information mentioned above, it can be stated that the data fitted the model well (See Table 16).

Table 16 The results of the ARDL cointegration test

Estimated equation			$IMP_t = f(FDI_t, EXP_t)$	
Autoselected lag structure			(2,1,1)	
Cointegration	F value	Significance	Critical values	
			lower bounds I(0)	upper bounds I(1)
Yes	12.64489	10%	2.63	3.35
		5%	3.1	3.87
		1%	4.13	5
R-squared			0.724642	
Adjusted R-squared			0.688725	
F-statistic			20.17584	
Prob(F-statistic)			0.000000	
Durbin-Watson stat			1.894519	

Source: Author`s own calculations.

4.2.5. The long-run and short-run estimation

After confirming the cointegration between the analyzed series via the ARDL cointegration test, the next step will be the estimation of the long-term and short-term coefficients. The findings which are listed in Table 34 indicate the long-term and short-term effects of the import of goods and services (IMP), foreign direct investment (FDI), and export of goods and services (EXP) in Turkey. According to the long-run analysis findings, a 1% increase in FDI, and EXP will lead to an increase in IMP by 43%, and 100% (coefficients: 0.438787, 1.001297), respectively, because all variables are statistically significant ($p < 0.05$) and coefficients are positive in sign. Based on the outputs of the short-term analysis, a 1% increase in FDI and EXP will lead to an increase in the import of goods and services (IMP) by 21% and 76% (coefficient: 0.211804, 0.762126) respectively, because FDI and EXP are statistically significant ($p < 0.05$) and the coefficient is positive in sign. Therefore, the coefficient of the error correction model CointEq(-1) is negative in sign (-0.788683) (should be not greater than 1) and statistically significant (p-value is 0.00, less than 0.05) which demonstrates that the import of goods and services (IMP) adjusts towards its long-term equilibrium at the rate of 78%. Based on the results of both the long-run and short-run analysis there is a significant and positive cointegration between the analyzed series. (See Table 17).

Table 17 The long-run and short-run analysis

Long-run analysis			Short-run analysis		
Variable	Coefficient	T-statistic and Prob.	Variable	Coefficient	T-statistic and Prob.
FDI	0.438787	[3.521454] *** (0.0010)	D(FDI)	0.211804	[5.718158]*** (0.0000)
EXP	1.001297	[5.114472] *** (0.0000)	D(EXP)	0.762126	[9.890898]*** (0.0000)
Constant	-1.471863	[-1.649214] (0.1059)	CointEq(-1)*	-0.788683	[-7.340180]*** (0.0000)

Note: In the table, the parentheses indicate p-values, brackets indicate t-statistics, and the asterisk (***) denotes statistical significance at a 1% level.

Source: Author`s own calculations.

4.2.6. Diagnostic tests

Serial correlation LM test

H_0: There is no serial correlation in the residual

Table 18 Breusch-Godfrey Serial Correlation LM Test

Statistic (χ^2)	Prob.
0.240633	0.8866

Source: Author`s own calculations.

We should accept the Null Hypothesis that there is no serial correlation in the residual, based on the p-value of the observed R-squared value (p-values >0.05; 0.88) (See Table 18).

Heteroscedasticity test

H_0: There is no heteroskedasticity in the residual

Table 19 Breusch-Pagan-Godfrey`s heteroskedasticity test

Statistic (χ^2)	Prob.
8.099471	0.2309

Source: Author`s own calculations.

We should accept the Null Hypothesis that there is no heteroskedasticity in the residual, based on the p-value of the observed r-squared value (p values >0.05; 0.23) (See Table 19).

Normality test

H_0: Residual is normally distributed

Table 20 Jarque-Bera Normality Test

Statistic (χ^2)	Prob.
2.181490	0.3359

Source: Author`s own calculations.

We should accept the Null Hypothesis that residual is normally distributed, based on the p-value of Jarque-Bera value (p-value >0.05; 0.33) (See Table 20).

Ramsey RESET test

H_0: Model is stable (correctly specified)

Table 21 Ramsey RESET test

Statistic (χ^2)	Prob.
2.022873	0.0766

Source: Author`s own calculations.

We should accept the Null Hypothesis that the model is correctly specified, based on the p-value of the F-statistic (p values > 0.05; 0.07) (See Table 21).

CUSUM stability test

In order to check the stability in the examined long-term model, the CUSUM and CUSUMSQ stability tests will be employed in the model. According to the output

of the CUSUM and CUSUMSQ tests, the estimated model is steady during the relevant period (See Figure 4).

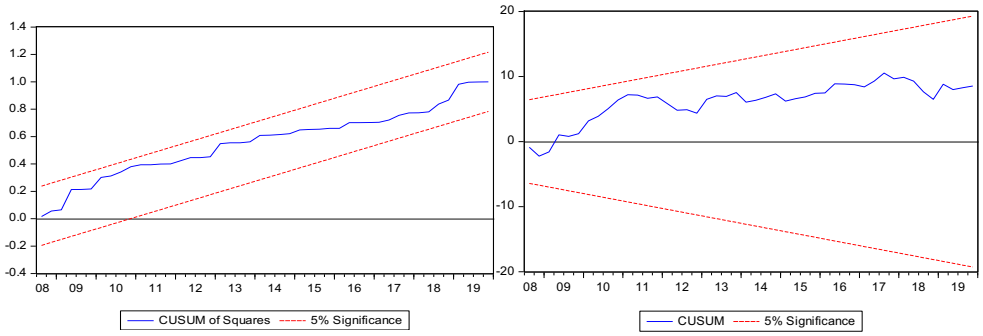


Figure 4 The CUSUM and CUSUMSQ stability tests
Source: Author`s own calculations.

4.2.7. Granger Causality test

As earlier stated, the Granger Causality analysis will also investigate the relationship between IMP and FDI. The test's null hypothesis is stated below:
H_0: FDI does not Granger Cause IMP, and
H_0: IMP does not Granger Cause FDI
When the probability value is lesser than 0.05 percent, the null hypothesis is discarded.

Table 22 Granger Causality test for FDI and IMP

Pairwise Granger causality test, Lags 2, Sample 2006 Q2-2019 Q4, Observations 53		
Null Hypothesis	**F-statistic**	**Prob.**
FDI does not Granger Cause IMP	6.36278	0.0036
IMP does not Granger Cause FDI	1.63266	0.2063

Source: Author`s own calculations.

Based on the Granger causality analysis findings, the null hypothesis of no causality running from FDI to IMP must be rejected predicated on a P-value = 0.0036 (less than 0.05). As a result, the second null hypothesis of no causal relationship between IMP and FDI must be accepted and predicated on a P-value = 0.20 (more than 0.05). Hence, the Granger causality test findings revealed a unidirectional causality running from FDI to IMP (See Table 22).
Overall, the findings match the literature and the premises of the study. The overview is described in-depth as obeys:
According to empirical findings, it was supported that there was a co-integration among the examined variables, a long-run and short-run relationship between the

analyzed series, and a unidirectional causal relationship from FDI to IMP. According to the obtained findings, it was supported that FDI inflows positively affect imports in Turkey.

The findings of the econometrical tests on FDI and trade relationship were in line with the studies of (Karimov, 2019; Metulini и др., 2017; Mukhtarov и др., 2019; Savićević & Kostić, 2020; Simionescu, 2014) and was opposite to the research of (Bhasin & Kapoor, 2020).

5. Conclusions and policy recommendations

5.1. Conclusions

The main objective of this study was to examine the impact of FDI on trade (import and export) in Turkey. Considering theories about FDI and Trade relationships, we can say that they are positively related. Additionally, most empirical literature as well showed a positive relationship between FDI and trade. In order to prove our assumptions, we needed further estimations via empirical calculations. Thus, now let us glance at the results of the third part of the statistical analysis of this study. The findings of the analysis of the ARDL bounds test approach have indicated a cointegration between FDI and Trade (EXP and IMP). Additionally, the outputs of the long-run analysis have shown a long-run relationship between FDI and Trade (EXP and IMP). The results of the Error Correction Model have shown a short-run relationship just between FDI and IMP. There was no short-run relationship between FDI and IMP. Furthermore, the results of the last analysis, the Granger causality test have shown a unidirectional causality running from FDI to EXP and a bidirectional causality running from FDI to IMP and vice versa. Due to the cheap skilled labor force, transportation costs, etc., the international parent company will produce its products in Turkey and then export them to the origin country. Hence, considering the information above, we can conclude that FDI inflows boost export in Turkey. Therefore, to manufacture products, foreign parent companies need to import raw materials or some unique parts to Turkey to accomplish the assembling. Thus, considering the information mentioned earlier, we can conclude that FDI inflows boost imports in Turkey. Overall, the FDI inflows into the Turkish economy have a positive impact on Trade (Export and Import).

5.2. Policy recommendations

According to the results of the study, it was confirmed that Foreign Direct Investment (FDI) has a positive effect on trade (export and import) in Turkey. As it is known with the line of increase of the export of the country the profit of the country also will grow which is back will lead to economic growth. Additionally, foreign investment in labor-intensive sectors will decrease unemployment and will increase production and in turn, will boost the export and finally will result in economic

growth. As we see all these actions are tightly linked to each other. Moreover, alongside export, the import of goods and services also plays a crucial role. Because in order to assemble the products the companies need raw materials, advanced machinery, and specialist which is not available or very scarce in host countries. That is why in order to boost the export the import of goods and services is very important. Thus, to promote trade the Turkish state should implement a low level of taxes for imported and exported products in order to attract more attention from foreign investors and boost the export of the country. Another important policy recommendation would be to increase the quality level of transportation and decrease transportation costs. Additionally, as it was mentioned above for economic growth, the promotion of R&D in the country will also boost export. Because with the support of government and foreign investors local institutions can make research and establish new technologies which in turn will be supporting production and will lead to an increase in export or the institutions will sell those newly established technologies to foreign markets which is a lack of this kind of advanced technologies. Additionally, the creation of a free economic zone (to free the foreign skilled labor from income taxes, social security payments, etc.) in the regions of Turkey especially in logistic zones will attract the attention of foreign investors. Therefore, to shift the attention of foreign investors to competitive sectors of Turkey. Textiles, high-tech military technology, education, etc., can be a good example of this assumption.

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Author Contributions
KMI conceived the study. NEV were responsible for the design and development of the data analysis. KMI was responsible for data collection. KMI was responsible for data analysis and also for data interpretation. NEV and ZEC were responsible for the literature review section. ZEC, corrected and approved the final manuscript.

Disclosure Statement
The authors have not any competing financial, professional, or personal interests from other parties.

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Notes:

[1] Türkiye İstatistik Kurumu. https://www.tuik.gov.tr/.
[2] The World Bank. https://data.worldbank.org/indicator/SL.TLF.ACTI.ZS.
[3] Presidency of the Republic of Turkey, Investment office. https://www.invest.gov.tr/en/pages/turkey-fdi-strategy.aspx.
[4] Machine learning plus. https://www.machinelearningplus.com/time-series/augmented-dickey-fuller-test/.
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