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The Impact of Foreign Direct Investment on Economic Growth in Türkiye: ARDL Approach

[Vliv přímých zahraničních investic na hospodářský růst v Turecku: přístup ARDL]

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Abstract: This paper investigates the impact of Foreign Direct Investment inflows on economic growth in Türkiye. The study covers the period from 2006 Q2 to 2019 Q4. Time series datasets obtained from the CBT and FRED database are used for statistical analyses, including ADF, PP, Zivot Andrews Unit Root Tests, the ARDL bounds testing approach, and the Granger Causality tests, to fulfil the empirical part of the study. Based on the obtained findings, it was confirmed that, Foreign Direct Investment inflows have a positive impact on economic growth in Türkiye. Moreover, the results of the Granger causality analysis reveal a bidirectional relationship between FDI and GDP.

Keywords: ARDL bounds testing approach and Granger causality test, FDI, GDP, Türkiye, Unit root tests.

JEL classification: B22, B27, C12, F21

Introduction

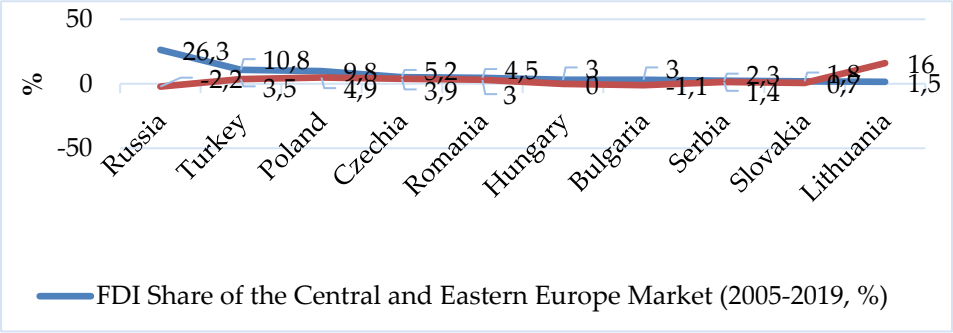
Foreign direct investments involve various forms, including purchasing a company from one nation and relocating it elsewhere, contributing capital to a recently founded company, or raising the capital of an operating company (Calal et al. 2023, Karimov et al. 2023). The individual who will significantly raise foreign direct capital can have the firm, entity, or organization in that country utilize their possess equipment or label name in whatever market they wish to access. Foreign direct investors often seek economies with cost-effective and plentiful manufacturing possibilities, greater domestic market consumption, and attractive infrastructure and business incentives (Karimov 2019, Karimov et al. 2020). In addition to economic factors, foreign direct investors consider the political situation of the hosting countries in which they intend to invest. A further characteristic of FDI capital flow is the transfer of intangible equipment, brand and managerial staff knowledge, as well as the ability to regulate the investor's activity (Karimov 2020). Previous empirical studies have demonstrated that, depending on the size of the hosted marketplace, the level of workforce, infrastructure, and the hosting nation's projected wealth, Foreign Direct Investment (FDI) can contribute to desired economic growth in hosting nations (Belkania & Karimov 2018). Moreover, FDI is conceptually viewed as an essential element that drives economic growth. (Lucas 1998; Ramsey 1928; Romer 1986, 1990; Solow 1956), in host countries.

FDI has been identified as a distinct strategy statement under the Turkish FDI Strategy as one of the significant supporting aspects of industrial, commercial, and fiscal policies (2021-2023). Amid current transition and instability in the international economy, the struggle for FDI

attraction between nations has grown (TFDİS 2021). Türkiye would significantly contribute to achieving Turkish 2023 goals through a target-oriented FDI policy for delivering value-added, knowledge-intensive investing, creating high-quality jobs required for Türkiye during this timeframe. Türkiye's FDI strategy (2021-2023) is related to Türkiye's 11th Development Plan (2019-2023), Türkiye's New Economic Program (2020-2022), 2023 Industry and Technology Strategy, and 2023 Türkiye's Export Strategy for its structure aims, and methods created to accomplish these objectives (TFDİS 2021).

Now, let us consider the statistics of United Nations Conference on Trade and Development (UNCTAD); we can see that Türkiye is in second place with a reception of FDI after Russia in Central and Eastern Europe (See Figure 1). Comparing Türkiye to Russia, we find that the performance of Russia is based on the availability of vast natural resources and a large market of nearly 145 million people. Türkiye stands out as an excellent business location for productivity search, while Russia remains an appealing investing target for FDI searching for the marketplace and looking for natural assets (TFDİS 2021).

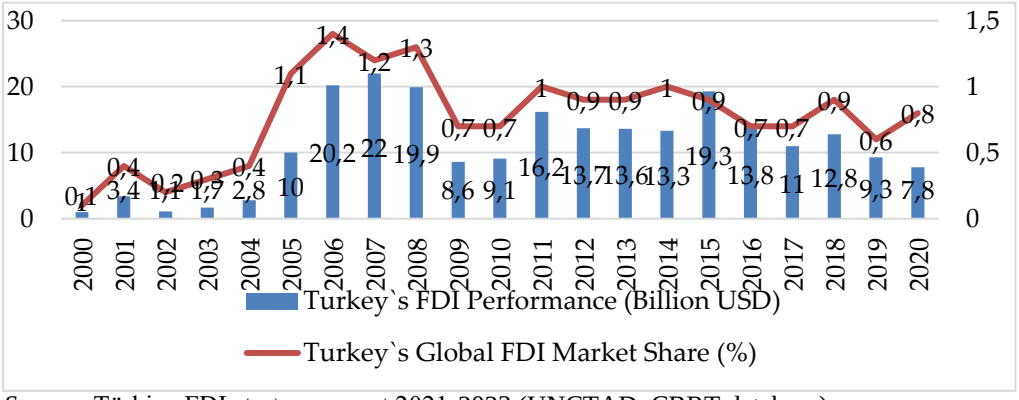
Figure 1: Top 10 countries with the FDI performance among the Central and Eastern Europe (%)



(0) The FDI directed to Hungary in 2015 and 2016 is indicated as unfavorable in FDI UNCTAD records
Source: Türkiye FDI strategy report 2021-2023 (based on UNCTAD, WIR Annex Tables database)

Türkiye began a vigorous restructuring effort after 2000, aimed at improving the country's economic environment. The concept of equality adopted in 2003 by Law No 4875 on Foreign Direct Investment boosted the trust of foreign investors in Türkiye and encouraged investment in Türkiye. Türkiye obtained an average proportion of the international FDI market in the years that preceded the FDI law, 0.9%, making Türkiye one of the most attractive countries in the area. As a result of the worldwide 2007-2008 financial crisis, Türkiye's participation in the global FDI market comparable to Central and Eastern Europe declined partially. On the other side, Turkish participation is seen to be relatively horizontal (TFDİS 2021) (See Figure 2).

Figure 2: Türkiye's Share in the Global FDI Market (2000-2020, Billion USD, %)



Source: Türkiye FDI strategy report 2021-2023 (UNCTAD, CBRT database)

The purpose of this research is to contribute to the empirical literature on the link among economic growth and FDI inflows in host countries. By considering the findings and recommendations of this investigation, Turkish policymakers can address current issues in the Turkish economy and increase the volume of FDI capital flows into the Turkish economy. The remainder of this paper is structured as follows: Chapter 2 presents the empirical literature review. Chapter 3 provides the material and methods. The empirical findings and discussion are reported in chapter 4. The last chapter of this study displays the conclusion and policy recommendations.

1 Empirical literature review

Foreign Direct Investments play a significant role in the economic growth of developing countries. On the other side, FDI is similarly vital for developed countries. Nevertheless, their objectives are not similar both sides have mutual interests in boosting FDI flows. A vast number of studies have explored the correlation among FDI and Economic growth over the last decades. According to the utilized dataset, chosen geographical region, statistical model, and so on, researchers obtained positive and negative relationships between FDI and economic growth. Nistor (2014) studied the effects of FDI on economic growth from 1990 to 2012 in Romania. The regression analysis method has been applied for the empirical part of his study. In order to determine the impact using econometric models in his model, he included the dependent variable Gross Domestic Product (GDP), and the independent variables, foreign direct investment inflows (FDI), government expenditure (GE), and gross fixed capital formation (GFCF). According to the results gained from the statistical model, there was a positive correlation between FDI and economic growth regarding Romania. The research results concluded that FDI could be considered an active factor in developing and adapting to the market economy and competitiveness. In another notably study by Chakraborty & Nunnenkamp (2008) the impact of FDI on economic growth in India was analyzed for the period from 1987 to 2000. The Unit Root, Panel co-integration, and Granger causality tests were employed in their models. According to the gained results from the statistical part of the paper, they observed that the growth effects of FDI alter extensively beyond sectors. The findings showed that FDI stocks and output are mutually reinforcing in the manufacturing sector, whereas no significant link was observed between the United States of America in the tertiary industry. They found just transitory impacts of FDI on output in the services industry. Nevertheless, FDI in the services industry seems to have promoted growth in the manufacturing sector through cross-sector spillovers. Another research was conducted by Falki (2009) regarding Pakistan for the period from 1980 to 2006. The main focus of his study was to analyze the impact of FDI on economic growth. The production function based on the endogenous growth theory was utilized in his studies. The following variables as trade, domestic capital and, labor are also utilized in his model. The results of his study indicate a negative and statistically insignificant relationship between the GDP and FDI Inflows in Pakistan. The following research Karimov & Belkania (2018) examined the relationship between Türkiye's economic growth and Foreign Direct Investment for 1980-2017. The ADF unit root test, the Johansen co-integration test, and Granger causality tests have been used in their researchers. According to the empirical part of the paper, there was a presence of co-integration between the analyzed series (FDI and GDP). Therefore, results gained from the Granger causality test showed a unidirectional causality from FDI to GDP. Hence, the findings of these researchers have shown that there is a significant impact of FDI on economic growth in Türkiye. Baiashvili & Gattini (2020), investigated the impact of FDI inflows on growth and their effect mediated by income levels and the quality of the institutional environment. Particularly researchers concentrated on the interaction among country income levels – including low, middle, and high-income countries and Foreign Direct Investment. Their study is based on 111 countries,

including developed, developing, and emerging economies starting in 1980. Their estimations make use of the panel GMM techniques robust to the sample size, instrument proliferation, and endogeneity concerns. Moreover, they deployed dynamic panel methods using Generalized Method of Moments (GMM) estimators. They detected that FDI benefits do not grow mechanically and evenly across countries. They discovered a causality relationship between countries' income levels and the size of FDI impact on growth. Hence, as countries transition from low to middle income, the impact becomes more significant. On the other hand, the shift to high-income economies is decreasing again. Finally, yet importantly, they found that absorptive capacity matters in channeling FDI effects. Institutional factors positively mediate FDI within-country income groups, whereby countries with better-developed institutions relative to their income group peers positively impacted FDI on economic growth. Dar et al. (2016) analysed the Foreign Direct Investment (FDI) effects on economic growth in Pakistan for the 2 period of time 1997-2001, 2002-2013. The Vector Error Correction Model (VECM), panel co-integration test and the Principle Component Analysis (PCA) have been employed in the methodological part of their paper. The Pakistani economy has been categorized into primary, secondary, and tertiary sectors for the purpose of this research. According to results from the panel approach, there was a long-run and short-run relationship between GDP and FDI, although interactions between sectors are alarming. FDI in the primary sector has exhibited short-term relationships with economic growth. Furthermore, the results indicated no cross-sector spillover presence between Pakistan's primary, secondary, and tertiary sectors. (Kisswani et al. 2015), studied the connection between FDI and real GDP for the covered time from 1994:Q1 to 2013:Q2 in Estonia. The real GDP was retrieved from Eurostat, while the FDI data was collected from the Bank of Estonia. The ADF unit root test, the Johansen co-integration test, Granger causality tests, and the Vector Error Correction Model have been employed for the statistical part of their studies. The results gained from the Johansen co-integration test showed a long-run co-integration between FDI and real GDP. According to the results of Granger causality, FDI granger causes real GDP. (Silajdzic & Mehic 2015), investigated the impact of FDI and the related externalities on economic growth in transition economies. In their analysis, the principal variables of interest were the FDI variable (FDI share) and the two R&D variables, specifically RDgov and RDbus. The OLS approach has been utilized in the empirical section of the study. Based on the gained results, they deduced that FDI contributes to economic growth predominantly through knowledge spillovers. Due to government and industry R & D costs, a more significant technical degree of progress is related to more robust growth performance across transition economies due to government and industry R&D costs. Hence the findings of this research allowed them to determine that the positive influence of FDI on economic growth is associated with more knowledge-capability and efficiency-seeking FDI. (Gál & Gyimesi 2021) analyzed the impact of FDI on economic growth and Gross Fixed Capital Formation (GFCF) in the Hungarian regions. Based on the results of the empirical analysis it was found that there is a negative relationship between the analyzed series. The authors revealed that the investment which comes from state and European Union Funds performs a huge role than Foreign Direct Investment in Hungarian regions.

2 Materials and method

2.1 Materials

2.1.1 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 Türkiye (CBT) for the period span from 2006 Q2 to 2019 Q4. Before converting to percentage changes, 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.

2.1.2 The built econometric model

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

Table 1: Description of utilized variables in econometric model

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

Source: Authors` own compilation

2.1.3 Model specification

Explanatory variables in the constructed model have been selected based on previous studies conducted by other researchers. Based on those series below mentioned model has been built (1):

$GDP_t = f(FDI_t, EXP_t, GFCF_t)$……..(1)

2.2 Methods

2.2.1 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[1].

2.2.2 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 H_0 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.

2.2.3 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

[1] Machine learning plus
https://www.machinelearningplus.com/time-series/augmented-dickey-fuller-test/

transitions can all result in structural alterations in time series (Iranmanesh & Jalaee 2021). When a structural break is not considered in the time series trend, the estimation findings may be skewed toward 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).

2.2.4 ARDL bounds testing approach:

There are several widely applied cointegration tests that are utilized to investigate the relationship between analysed 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 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 for small samples.
The equation of the general ARDL model is as following (2):

$$\varphi(L)\gamma_t = \delta + \theta(L)x_t + u_t, \ldots\ldots\ldots\ldots (2)$$

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[2].
The built econometric model considering ARDL approach equation are as following (3):

$$\Delta \mathrm{GDP_t} = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=0}^{k} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{k} \alpha_{3i} \Delta EXP_{t-i} + \sum_{i=0}^{k} \alpha_{4i} \Delta GFCF_{t-i} + \alpha_5 GDP_{t-1} + \alpha_6 FDI_{t-1} + \alpha_7 EXP_{t-1} + \alpha_8 GFCF_{t-1} + \varepsilon_t, \ldots\ldots\ldots\ldots\ldots (3)$$

The steps of the ARDL analysis are as following: first if there is a presence of the cointegration between analysed 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 analysed series are checked via these hypothesizes:
H_0: $a_1=a_2=a_3=a_4=a_5$;
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 analysed series and H_a indicates that there is a cointegration between analysed series. In order to reject the null hypothesis and accept the alternative hypothesis that, there is a cointegration between analysed series the F-statistics value should be not less than critical values of the lower bound and upper bound.

2.2.5 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 using time series VAR is that it allows us to evaluate ‘causality' in various ways. Clive Granger was

[2] Reed college materials
https://www.reed.edu/economics/parker/312/tschapters/S13_Ch_3.pdf

the first who suggested such 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[3].

3 Empirical findings and discussion

The objective of research: To establish the effect of FDI inflows on the GDP of Türkiye
RQ: Is FDI a significant contributor to economic growth?
H1: Foreign Direct Investment has a positive impact on Gross Domestic Product
The results of the econometrical tests which were utilized at the built model are presented and discussed in this section.

3.1 Descriptive statistics

The descriptive statistics and correlation values of the utilized series have been described in Table 2. The correlation matrix findings indicate a strong and positive relationship between FDI, EXP, GFCF and GDP. The preliminary information about the relationships between series gained through the descriptive statistics and correlation matrix is not enough to determine the relationship between analysed variables. In order to obtain more reliable outcomes about the relationship between analysed series the statistical methods will be utilized in this study.

Table 2: Descriptive statistics and correlation of the variables

	GDP	FDI	EXP	GCF
Mean	0.872256	2.415403	1.620071	0.903004
Median	2.373952	2.585822	1.775871	2.062274
Maximum	13.10307	41.58270	18.14356	15.67890
Minimum	-22.24286	-23.88768	-19.51142	-24.08571
Std. Dev.	6.535354	12.67748	6.046521	8.359276
Skewness	-1.254966	0.544393	-0.153574	-1.200002
Kurtosis	5.231847	3.797520	5.491040	4.825781
Jarque-Bera	25.85205	4.174258	14.43663	20.83925
Correlation				
GDP	1.000000			
FDI	0.514992	1.000000		
EXP	0.550121	0.055158	1.000000	
GFCF	0.896192	0.398363	0.428384	1.000000

Source: Author`s own calculations

3.2 ADF and PP unit root tests:

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 3).

[3] Medium
https://medium.com/swlh/using-granger-causality-test-to-know-if-one-time-series-is-impacting-in-predicting-another-6285b9fd2d1c

Table 3: The outcomes of the ADF and PP test

Variables	ADF (Intercept and trend)		PP (Intercept and trend)	
	Level	Decision	Level	Decision
GDP	[-5.061275]** (0.0007)	I(0)	[-5.897364]** (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)
GFCF	[-6.096379]** (0.0000)	I(0)	[-6.110011]** (0.0000)	I(0)

Note: In the ADF and PP unit root tests, the parentheses indicate p-values, brackets indicate t-statistics, and asterisk (**) denotes statistical significance at a 5% level.
Source: Author`s own calculations

3.3 Zivot-Andrews unit root test (structural break):

The Zivot-Andrews unit root test was employed in order to check 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 are non-stationary. The alternative hypothesis (H_1) of this analysis states that the series does not have unit root and the series are stationary.

Table 4: 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
GDP	-5.174486**	2010 Q2	-6.089854***	2009 Q1	-6.003069***	2009 Q3
FDI	-7.295840***	2010 Q4	-5.099453**	2015 Q2	-8.385223***	2009 Q2
EXPR	-5.693655***	2008 Q4	-6.578393***	2009 Q1	-5.693655***	2008 Q4
GCF	-5.619979***	2010 Q3	-4.590047*	2011 Q3	-6.645603***	2010 Q2

Note: The critical values for Model A and B at 1%, 5%, and 10% significance level are -5.34, -4.93, and -4.58 respectively. The critical values for Model C at 1%, 5%, and 10% significance level 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 shows that the t-statistics of the model is 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 a one structural break (See Table 4).

3.4 ARDL bounds testing approach:

When compared to 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 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 (Autoregressive Distributed Lag) bounds test there is a presence of cointegration between FDI, EXP, GFCF, and GDP in Türkiye from 2006 to 2019. Therefore, R-squared is 0.92 which means

the dependent variable is explained by 92 percent. Furthermore, the probability of (F-statistic) is 0.00000, which means F-statistic is significant. Additionally, the Durbin-Watson statistic is 1.946103 (close to two is desirable). Based on the information mentioned above, it can be stated that the data fitted the model well (See Table 5).

Table 5: The results of the ARDL cointegration test

Estimated equation			GDPt= f(FDIt, EXPt, GFCFt)	
Autoselected lag structure			(2,2,2)	
Cointegration	F value	Significance	Critical values	
			lower bounds I(0)	upper bounds I(1)
Yes	5.888004	10%	2.37	3.2
		5%	2.79	3.67
		1%	3.65	4.66
R-squared			0.929446	
Adjusted R-squared			0.910517	
F-statistic			49.10136	
Prob(F-statistic)			0.00000	
Durbin-Watson stat			1.946103	

Source: Author`s own calculations

3.5 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 8 indicate the long-term and short-term effects of economic growth (GDP), foreign direct investment (FDI), export of goods and services (EXP), and gross fixed capital formation (GFCF) in Türkiye. According to the long-run analysis findings, a 1% increase in FDI, EXP and GFCF will lead to an increase in economic growth (GDP) by 17%, 55%, and 36% (coefficients: 0.170007, 0.553107, 0.363388), 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, EXP and GFCF will lead to an increase in economic growth (GDP) by 12%, 30%, and 54% (coefficients: 0.118619, 0.296857, 0.540925), respectively, because all variables are statistically significant ($p < 0.05$) and coefficients are positive in sign. Therefore, the coefficient of the error correction model CointEq(-) is negative in sign (-0.741965) (should not be greater than 1) and statistically significant (p-value is 0.00, less than 0.05) which demonstrates that the economic growth (GDP) adjusts towards its long-term equilibrium at the rate of 74%. Based on the results of both the long-run and short-run analysis there is a significant and positive cointegration between the analysed series (See Table 6).

Table 6: 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	0.170007	[2.653211]** (0.01)	D(FDI)	0.118619	[6.164995] ** (0.00)
EXPR	0.553107	[3.160526]** (0.00)	D(EXPR)	0.296857	[6.830952] ** (0.00)
GCF	0.363388	[3.077543]** (0.00)	D(GCF)	0.540925	[15.92783] ** (0.00)
Constant	-0.703264	[-1.561070] (0.12)	CointEq(-1)*	-0.741965	[-5.684384]** (0.00)

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

3.6 Diagnostic tests

3.6.1 Serial correlation LM test

H_0: There is no serial correlation in the residual

Table 7: Breusch-Godfrey Serial Correlation LM Test

Statistic (χ^2)	Prob.
0.445696	0.8002

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; 0.80) (See Table 7).

3.6.2 Heteroscedasticity test

H_0: There is no heteroskedasticity in the residual

Table 8: Breusch-Pagan-Godfrey`s heteroskedasticity test

Statistic (χ^2)	Prob.
5.571988	0.90

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 observed r-squared value (p values >0.05; 0.90) (See Table 8).

3.6.3 Normality test

H_0: Residual is normally distributed

Table 9: Jarque-Bera Normality Test

Statistic (χ^2)	Prob.
0.293626	0.86

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; 0.86) (See Table 9).

3.6.4 Ramsey RESET test

H_0: Model is stable (correctly specified)

Table 10: Ramsey RESET test

Statistic (χ^2)	Prob.
2.328352	0.13

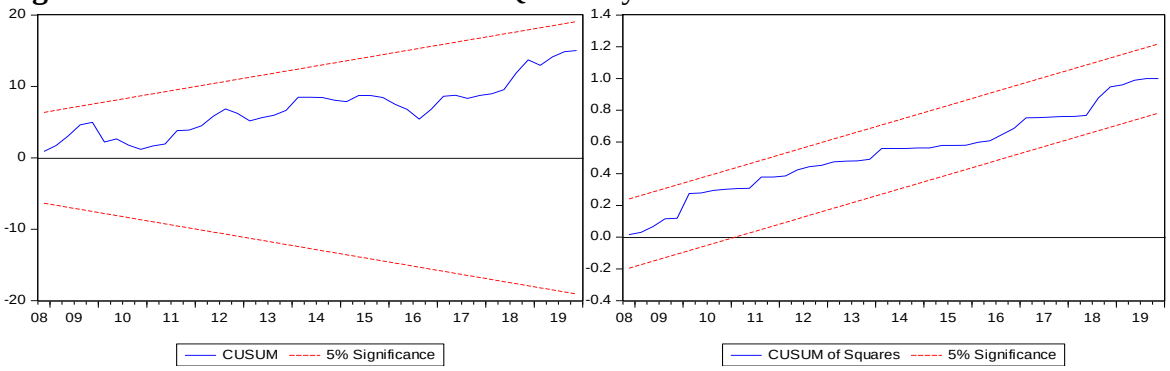
Source: Author`s own calculations

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; 0.13) (See Table 10).

3.6.5 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

3.6.6 Granger Causality test

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

H_0: FDI does not Granger Cause GDP, and

H_0: GDP 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 3, Sample 2006 Q2 - 2019 Q4, Observations 53		
Null Hypothesis	**F-statistic**	**Prob.**
FDI does not Granger Cause GDP	6.42973	0.0010
GDP does not Granger Cause FDI	3.91179	0.0145

Source: Author`s own calculations

Based on the Granger causality analysis findings, the null hypothesis of no causality running from FDI to GDP must be declined predicated on a P-value=0.001 (less than 0.05%). As a result, the second null hypothesis of no causality running from GDP to FDI must be discarded predicated on a P-value = 0.01 (less than 0.05 %). Hence, the Granger causality test findings revealed a bidirectional relationship between FDI and GDP (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 analysed variables, the long-run and short-run analysis shows a significant and positive relationship between independent and dependent variables in long-term and short-term, and finally Granger causality test indicates bidirectional causality among analysed variables. Overall, considering all obtained empirical findings, it was supported that FDI is a significant contributor to economic growth in Türkiye.

Conclusion and policy recommendations

Conclusion

The main objective of this study was to examine the impact of FDI on economic growth in Türkiye. Considering the theoretical literature review on the relationship between FDI and the economic growth, we can confirm a positive impact on the economic growth of both investing and host countries. Contrary to theories, considering empirical literature review, we can see different results based on the picked period, region, and utilized empirical methods. The results of the analysis of the ARDL bounds test approach have indicated a co-integration between FDI

and GDP. Additionally, the outputs of the long-term test have shown a long-run cointegration between FDI and GDP, the results of the Error Correction Model have shown a short-run cointegration between analyzed series and the results of the last analysis, the Granger causality test has shown a bidirectional causality from FDI to GDP and vice versa. All together, we can interpret the empirical results as follows, with liberalization processes which began after 1980 up to the present time along with other factors enabled the Turkish state to attract FDI inflows and to boost economic growth with the help of FDI in the long term, and short term. Hence, we can conclude that FDI inflows have a positive impact on economic growth in Türkiye.

Policy recommendations

Based on the obtained results we can see that there is a positive effect of FDI on economic growth in Türkiye. Thus, in order to boost the economy, the Turkish state should attract more foreign investments. In order to achieve this, firstly they need to enhance the government promotions on foreign investors with giving a privilege to them. Furthermore, as another crucial factor, the state should facilitate ease of doing business for foreign investors through liberalization reforms. Also, as it is known from the theories and practice the infrastructure is very important for foreign investors. Thus, the Turkish state should develop the infrastructure not just in big cities but also small rural areas in order to attract attention of investors to the whole part of the country. Another major problem of Türkiye is a financial market which is very unstable. Additionally, the promotion of R&D in the country with the help of institutions through the government support would play a significant role in economic growth. Alongside economic stability the Turkish state must also address the political stability within the country, which is one of the greatest issues in terms of attracting FDI into the country. For instance, the wars in neighboring countries and the military rebellion against the state in 2016 had a significant negative impact on FDI.

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