



Araştırma Makalesi • Research Article

Analysis of The Relationship Between GDP Growth and Foreign Direct Investment in Underdeveloped Countries: Tar Model

Az Gelişmiş Ülkelerde Kişi Başına Düşen GSYH Büyümesi ve Doğrudan Yabancı Yatırım Arasındaki İlişkinin Analizi: Tar Modeli

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Abstract: Economists argue that a relation between foreign direct investments (FDI) and economic growth exists. In many studies, it has been investigated the way FDI affect economic growth. In the literature, it has been concluded that foreign direct investment has a positive impact on economic growth. In some studies, it was determined that there was no causality between economic growth and direct foreign investments. This article differs from the other studies in terms of both its perspective and results. In this article, it is important to analyze how the per capita GDP growth affects FDI in opposition to the studies in the literature and it is thought that this study will contribute to the literature. Another feature that distinguishes this article from others is that the analyses are not linear analysis but nonlinear analysis. Obtained results will guide policy-makers. The results are of great importance for policymakers in underdeveloped countries in terms of saying that they need to keep their GDP per capita above the determined threshold otherwise FDI entering their countries would decrease.

Keywords: Foreign Direct Investment GDP Per Capita Growth, Tar Model, Less Developed Countries

Öz: İktisatçılar, doğrudan yabancı yatırımlarla ekonomik büyüme arasında bir ilişki olduğunu savunmaktadır. Yapılan çalışmaların çoğunda, doğrudan yabancı yatırımların ekonomik büyümeyi nasıl etkilediği konusu araştırılmıştır. Literatürde, genellikle doğrudan yabancı yatırımların ekonomik büyümeyi olumlu etkilediği sonucuna ulaşılmıştır. Bunun yanı sıra bazı araştırmacılar doğrudan yabancı yatırımlarla ekonomik büyüme arasında herhangi bir nedenselliğin bulunmadığı sonucuna ulaşmışlardır. Bu makale hem bakış açısı hem de elde ettiği sonuçlar açısından diğerlerinden farklıdır. Bu makale literatürdeki çalışmaların aksine kişi başına düşen GSYİH büyümesinin, doğrudan yabancı yatırımları nasıl etkilediğini analiz etmesi açısından önemlidir ve literature katkı yapacağı düşünülmektedir. Bu makaleyi diğerlerinden ayıran bir diğer özellik ise, analizlerin linear analiz değil nonlinear analiz olmasıdır. Elde edilen sonuçlar politika yapıcılarına yol gösterici nitelikte olacaktır. Sonuçlar az gelişmiş ülkelerdeki politika yapıcılarına, ülkelere doğrudan yabancı yatırımların girmesini sağlamak için kişi başına düşen GSYİH büyümesini belirlenen eşik değerin üzerinde tutmaları gerektiğini, aksi

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takdirde ülkelerine girmesi istenen doğrudan yabancı yatırımların azalacağını ifade etmesi açısından büyük bir öneme sahiptir.

Anahtar Kelimeler: Doğrudan Yabancı Yatırım Kişi Başına Düşen GSYİH Büyümesi, Tar Modeli, Az Gelişmiş Ülkeler

Introduction

Foreign Direct Investments (FDI) are the investments that are made by investors who are not within the borders of a country by establishing a factory in any country, opening a branch or buying an existing company partially or completely. (Eğilmez M 2016)

According to economists, a close relation between FDI and economic growth exists. Most of the surveys show the positive association between economic growth and FDI. This study aims to give a different perspective to literature. Rather than focusing on the way FDI affects economic growth, this article concentrates on the extent to which economic growth affects FDI.

FDI has a great impact, especially in underdeveloped countries, in order to achieve economic development. For underdeveloped countries, it is not easy to make investments that are unaffordable for domestic capital. These investments can only be made by the external borrowing of the state, or by the entry of foreign investments into the country. Countries that can attract foreign investors will not prefer to make these investments by external borrowing. Therefore, although it is known that foreign investments will positively affect economic growth, it is significant to emphasize how this foreign investment can be introduced into the country. The effects of GDP per capita growth on foreign investments were analyzed in this study.

It is possible to say that in recent years, FDI has been growing significantly in all around the world, while developing countries are more successful in attracting FDI than developed countries. In addition, we can say that institutional factors are the determinant factor for FDI in emerging markets. (Uddin, Chowdhury, Zafar et al. 2018)

Kayalvizhi and Thenmozhi, in their study in 2018, conducted a study for 22 developing economies and stated that technology is the leading of the factors affecting foreign investments. They also argued that increasing the quality of management in the country would increase the impact on FDI.

FDI attracted the attention of all states and led states to compete with each other in attracting foreign capital. Foreign investments generally affected the economic indicators positively in the countries in which they entered the market. (Nistor 2014)

Foreign investments see emerging markets more profitable and do not hesitate to invest in the market if there is confidence in countries. In order for the underdeveloped countries to attract foreign investments, there is a need for reliability in the market, strong and reliable management and positive developments in economic indicators.

By investigating the relations between FDI and the economic growth that is frequently seen in the literature, the aim of this study is to play a guiding role in how underdeveloped countries will attract these investments

After the Introduction part of this study, the Literature review was carried out in the second part. In the third part, information about the data and the method was given. In the fourth part, empirical models and findings were given and finally in the fifth part, results and policy results were given.

Literature Review

In their work in 2007, Yao and Wei analyzed the relation between economic growth and FDI in the newly industrialized economies through panel cointegration tests. They used data from 29 provinces and municipalities between 1979-2003 years. As a result of the studies, they have determined that there is a positive impact of FDI on the economic growth of the newly industrialized societies.

Lee and Chang examined the relation between financial development and economic growth through panel cointegration analysis using data from 1970-2002 for 37 countries in 2009. As a

consequence of the analyzes, the influence of FDI and financial development on economic growth was evaluated and it was determined that financial development rather than FDI had a greater influence on economic growth.

In 2011, Tıwari and Mutascu analyzed the relation between FDI and economic growth for Asian countries by conducting panel data analysis for the period 1986-2008. As a result of the analyzes, they stated that the positive impacts of both FDI and exports on economic growth.

Chen and Zulkifli, in their study in 2012, analyzed the VECM model using data from Malaysia between 1980 and 2010 and stated that a two-way causality between FDI and economic growth exists in the long run and that the FDI positively affects economic growth. According to their findings, there is no short run Granger causality between FDI and economic growth.

In his study in 2013, Lee analyzed the relation between FDI and economic growth, carbon emission and clean energy use by using data from 19 of the G20 countries between 1920 and 2009. As a result of his evaluations, he stated the important influence of FDI on economic growth for G20 countries.

Almfraji, Almsafir and Yao analyzed the influences of FDI in Qatar on the economy between 1990 and 2010 in their study by utilizing time series and Granger causality analysis. According to their conclusions, they stated that economic growth and FDI in Qatar are in interaction with each other in the long term.

In 2014, Loris and Diby analyzed the influence of FDI on economic growth by conducting SYM-GMM analyzes by utilizing data from 50 African countries for the period 1980-2009. As a result of their analysis, they determined a significant positive impact of FDI on the economic growth of African countries within these periods.

In 2015, Fadhil and Almsafir used the data in Malzeyya between 1975 and 2010 and analyzed the relation between economic growth and FDI with the Johansen test and unit root tests. As a result of their analyses, they stated that FDI strongly made a contribution to economic growth.

In his study in 2015, Hong has done GMM analysis for 254 cities in China using data from 1994 to 2010. As a result of his examinations, he concluded that a positive influence of FDI on economic development existed.

Iamsiraroj and Ulubaşoğlu analyzed the relation between FDI and economic growth by utilizing data from 140 countries between the years of 1970-2009. According to the results of their analyses, they concluded that FDI positively affected economic growth.

In 2015, Kinuthia and Murshed analyzed the data between 19060 and 2009 in the vector autoregressive model and examined the relationship between FDI and economic growth in Kenya and Malaysia. They concluded that FDI did not support economic growth in Kenya but supported economic growth in Malaysia.

In his study conducted in 2015, Pegkas conducted a panel data analysis using data from the years 2002-2012 in his study of the effect of FDI on 18 countries in the Eurozone. According to his findings, there is a positive influence of FDI on economic growth in the long term.

In 2016, Water and Liu conducted a panel analysis of Chinese cities for the period 1991-2010. As a result of their studies, they concluded that FDI have a positive influence on GDP per capita growth rate.

Alvarado, Iñiguez and Ponce conducted panel data analysis for 19 Latin American countries in 2017. As a result of their analysis, they found a positive relation between economic growth and FDI in high-income countries and stated that FDI does not affect economic growth with the exception of high-income countries.

Clean and Gökmen, in the study they have done in 2014, examined the relation between FDI and GDP growth in Turkey through Granger causality analysis and Johansen cointegration test. As a result

of their examination, they have determined that there is no causality between GDP growth and FDI in Turkey.

In 2018, Makun analyzed the impacts of external factors on economic growth using ARDL approach for the Republic of Fiji Islands between 1980 and 2015. As a conclusion of his analysis, it is concluded the positive effects of foreign exchange and FDI on economic growth both in the short and long run.

Data and Method

The data used in this study consisted of observations from 9 underdeveloped countries (Nigeria, Senegal, Mali, Nepal, Madagascar, Burkina Faso, Ethiopia, Guinea and Mozambique) from 1998 to 2015. The data of GDP per capita (annual%) and FDI, net inflows (% of GDP) were obtained from the World Bank.

Tar Analysis was used in the model. As a consequence of the analysis, it is proved that the model is not linear but nonlinear.

In the long term, the following equation is utilized to analyze the relationship between GDP growth per capita (annual%) = $Gdp1$ and FDI, net inflows (% of GDP) = FDI

$$* FDI_{it} = \alpha_0 + \alpha_1 Gdp1_{it} + \alpha_2 MatrixX + u_i + \varepsilon_{it} \quad (I)$$

First, we determined the FDI in the short term and then tried to predict the long term FDI by using the δ coefficient.

In this equation, matrix x is a vector variable set that explains the factors affecting foreign direct investment and gdp per capita.

$$* FDI_{it} - FDI_{it-1} = \delta (FDI_{it} - FDI_{it-1}) \quad (II)$$

The equation can be written as follows;

$$* FDI_{it} = \delta FDI_{it} + (1 - \delta) FDI_{it-1} \quad (III)$$

When III is replaced with I, the following equation is obtained.

$$* FDI_{it} = \delta \{ \alpha_0 + \alpha_1 Gdp1_{it} + \alpha_2 Matrix X + Gdp1 + u_i + \varepsilon_{it} \} + (1 - \delta) FDI_{it-1} \quad (IV)$$

Another alternative equation is;

$$* FDI_{it} = \delta \alpha_0 + \delta \alpha_1 Gdp1_{it} + \delta \alpha_2 Matrix X + (1 - \delta) FDI_{it-1} + u_i + \varepsilon_{it} \quad (V)$$

In this equation, $\delta \alpha_0$, $\delta \alpha_1$ coefficients do not see the effect of GDP per capita growth rate on FDI in the short term, while it shows the effect of α_2 in the long term. T-1 also reflects the cumulative effect of macroeconomic factors.

Moreover, this model does not show when the level of the relation between GDP growth rate per capita and FDI has changed. Therefore, it was decided to use the threshold model. Thanks to this model, the equation can be divided into regimes and tested in this way. (threshold values are tested depending on the Inf variable) In the case of the nonlinear model, the equation can be written as follows.

$$* FDI_{it} = \{ \beta_{10} + \beta_{11} Gdp1_{it} + \beta_{12} Matrix X + \beta_{13} FDI_{it-1} \} d[Gdp1_{it} \leq \gamma_1] + \{ \beta_{20} + \beta_{21} Gdp1_{it} + \beta_{22} Matrix X + \beta_{23} FDI_{it-1} \} d[\gamma_1 < Gdp1_{it} \leq \gamma_2] + \{ \beta_{30} + \beta_{31} Gdp1_{it} + \beta_{32} Matrix X + \beta_{33} FDI_{it-1} \} d[Gdp1_{it} > \gamma_2] + u_i + \varepsilon_{it} \quad (VI)$$

Another alternative equation is as follows;

$$* FDI_{it} = \beta_0 + \beta_{11}Gdp1_{it}d(Gdp1_{it} \leq \gamma_1) + \beta_{21}Gdp1_{it}d(\gamma_1 < Gdp1_{it} \leq \gamma_2) + \beta_{31}Gdp1_{it}d(Gdp1_{it} > \gamma_2) + \beta_2Matrix X + \beta_3FDI_{t-1} + u_i + \varepsilon_{it} \tag{VII}$$

(Nguyen and To 2017)

In this model ;

In the first stage, it was tried to determine whether the model was linear or nonlinear. Provided that the F statistic is lower than the critical value, H₀ is acknowledged and the model is proved to be linear. If the F statistic is greater than the critical value, H₀ is rejected and the model is proved to be nonlinear.

In the second stage, the testing process continues until the F statistic is lower than the critical values and the number of breaks of the model is determined.

At the final stage, the probe values are checked to determine whether the findings are statistically significant.

Empirical Model and Findings

Table 1. Unit Root Test

Variable	Level		First order difference	
	Statistic	Prob	Statistic	Prob
Gdp	-4.19607	0.0000*	-17.2467	0.0000*
LLC	51.0075	0.0001*	168.365	0.0000*
ADF	97.7660	0.0000*	188.690	0.0000*
PP	Statistic	Prob	Statistic	Prob
Fd ₁	-2.34042	0.0096*	-8.20115	0.0000*
LLC	23.6715	0.1661	90.0777	0.0000*
ADF	23.8897	0.1587	147.076	0.0000*
PP				

*, ** and ***denotes 1%, 5% and 10% statistical significance level, respectively. intercept and SIC

As seen in the table, both variables have unit root stationarity at both level and first difference.

Table 2. Tar Model

gdp1	coefficient	StandardError	Prob	T	
0	-0.0106847	0.1578018	0.946	-0.07	
1	4.560422	1.126281	0.000	4.05	
2	4.222027	0.5655846	0.000	7.46	
3	-0.0842239	0.1485026	0.572	-0.57	
Cons	3.314993	0.45114	0.000	7.35	
Threshold	Fstat	%10 critical value	%5 critical value	%1 critical value	Prob
Single	9.34	5.6072	6.7195	9.4420	0.0133
Double	56.88	10.7858	13.9001	19.4939	0.0000
Triple	12.36	49.4357	57.9328	79.3153	0.2867
Model	Th-1	Th-21	Th-22	Th-3	
	4.5495	4.1187	3.9826	4.0704	

*Threshold bootstrap 300 replication

In this study, in order to find out the relation between GDP per capita (annual%) and FDI net inflows (% of GDP) analyses were made in the threshold model by using the data of 9 underdeveloped countries between 1998-2014

In the first stage, as shown in the above analysis, H₀ was rejected and the model was proved to be nonlinear, not linear because in the first model the F statistic (9,34 > 5,6072 and 9,34 > 6,7195) is bigger than the critical value at 10% and 5% (Crit 10, Crit 5) and the Prob value is 0,0133.

In the second stage, it was investigated whether there were H0 single threshold and H1 double threshold. In the double threshold results, it was found that the model had two nonlinear breaks in double threshold because of the fact that F value was greater than the critical values ($56,88 > 10,7858$; $56,88 > 13,9001$ and $56,88 > 19,4939$).

In the third stage, the triple-threshold model was rejected because F was less than the critical value ($12,36 < 49,4357$; $12,36 < 57,9328$ and $12,36 < 79,3153$).

As a result, when GDP growth per capita (annual%) increases by 1%, double threshold up to 4,1187% decreases FDI net inflows (% GDP) by 0,0106847%. However, the results are statistically insignificant since the probe is 0.946.

When GDP per capita growth (annual%) is between 4,1187% and 3,9826% and increases by 1 %, FDI net inflows (% of GDP) increases by 4,560422%. The results obtained were statistically significant since P is 0.000.

In addition, as seen in the model, when double threshold rises above 3,9826% and GDP per capita growth (annual%) increases by 1 %, GDP per capita growth (annual%) increases FDI net inflows (% of GDP) by 4,222027% and the results are statistically significant since P is 0.000.

Conclusion

In this paper, unlike the literature, it was analyzed how the GDP growth rate per capita affects FDI. A threshold value was calculated as a result of the analysis in the Tar model. It has been concluded that the GDP per capita growth rate decreases the FDI up to the determined threshold value and increases the FDI after the threshold value.

The results obtained are capable of showing the way for underdeveloped country managers. Underdeveloped country managers who want to attract FDI should prevent the per capita GDP growth rate from falling below the calculated threshold. If GDP growth falls below this threshold, FDI t will decrease. In order for a foreign investment to enter the country, an environment of trust must be established in the country. This environment of trust can be achieved both by the transparency and reliability of the managers and by the positive developments in the economic indicators. As the GDP per capita growth rate will be a positive indicator for the economy, policymakers should take the necessary measures to rise the GDP growth rate per capita in order to attract investments.

When the underdeveloped countries meet all these criteria, they will be able to attract FDI. FDI entering the country will have a positive impacts both on the recovery of the economy and on the enrichment of the country.

Disclosure Statements

1. The contributions of researchers were 50% of the first author and 50% of the second author.
2. No conflict of interest has been declared by the authors.

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Extended Abstract

There are many studies in the economics literature that analyze the relationship between foreign direct investments and economic growth. Studies are generally in the form of examining the relationship between foreign direct investments and economic growth. In this article, it is aimed to make a difference to the studies in the literature and the issue of how economic growth affects foreign direct investments is examined. When the literature is examined, it is observed that the analysis of the relationship between these two variables is generally carried out by linear methods. In this study, the model was analyzed as nonlinear rather than linear in order to give a different perspective to the literature. It is thought that the study will contribute to the literature both because the relationship between the variables is examined from a different perspective and because the model used is a nonlinear model.

In most of the studies analyzing the relationship between foreign direct investments and economic growth, it has been concluded that there is a positive relationship between these two variables. Yao and Wei's study, in which they examined 29 provinces and municipalities in 2007, found that foreign direct investment had a positive effect on economic growth. Tiwari and Mutascu stated in their study in 2011 that foreign direct investment and exports have a positive effect on economic growth for Asian countries. In their study on Malaysia in 2012, Chen and Zulkifli found that foreign direct investment positively affects economic growth and that there is a two-way causality between foreign direct investment and economic growth in the long run. In her/his 2013 study, Lee found that foreign direct investment in G20 countries has a significant positive effect on economic growth. Almfraji, Almsafir and Yao stated in their study in 2014 that foreign direct investment and economic growth in Qatar interact with each other in the long run. In their study in 2014, Loris and Diby concluded that foreign direct investment has a significant impact on the economic growth of African countries. Fadhil and Almsafir found that foreign direct investment has a strong positive relationship on economic growth, as a result of their research on Malaysia in 2015. In her/his research conducted in 2015, Hong concluded that foreign direct investment positively affects the economic development of China. In their study for 140 countries in 2015, Iamsiraroj and Ulubaşoğlu found that foreign direct investment had a positive effect on economic growth. In 2015, Pegkas concluded that foreign direct investment has a positive long-term effect on the economic growth of 18 Euro-zone countries. Su and Liu 2016 stated that foreign direct investment in China positively affects the per capita GDP growth rate. Makun stated in 2018 that foreign exchange and foreign direct investment positively affected the economic growth of the Republic of Fiji Islands both in the short term and in the long term.

In some rare studies in the literature, it has been concluded that there is no relationship between foreign direct investment and economic growth. Lee and Chang analyzed the relationship between foreign direct investment, financial development and economic growth in their study for 37 countries in 2009 and found that financial development has a greater impact on economic growth than foreign direct investment. In their study for Kenya and Malaysia in 2015, Kinuthia and Murshed concluded that foreign direct investment positively affected economic growth in Malaysia, but did not support it in Kenya. Alvarado, Iñiguez, and Ponce, in their study for 19 Latin American countries in 2017, concluded that foreign direct investment was positively correlated with economic growth only in high-income countries, and found that foreign direct investment had no effect on economic growth in low-income countries. As a result of their analysis in 2014, Temiz and Gökmen stated that there is no relationship between foreign direct investment and GDP growth in Turkey.

In this article, the data of 9 underdeveloped countries (Nigeria, Senegal, Mali, Nepal, Madagascar, Burkina Faso, Ethiopia, Guinea and Mozambique) between 1998 and 2015 were analyzed using the threshold autoregressive (TAR) model. As a result of the analysis, it has been proven that the model is a nonlinear model. The data used (long-term GDP growth per capita (in percent per annum) and foreign direct investment, net inflows (percent of GDP)) are obtained from the World Bank. Using these data, a nonlinear analysis was carried out and the relationship between economic growth and foreign direct investment was analyzed. As a result of the analysis, a threshold value was determined. In the analyzes carried out, it was concluded that foreign direct investments decreased by 0.0106847% in case of a 1% increase in per capita GDP growth below the threshold value of 4.187%. In addition, it was concluded that a 1% increase in per capita GDP growth increased foreign direct investments by 4.560422%, when the per capita GDP growth was between 4.187% and 3.9826%. If the per capita GDP growth occurs after 3.9826%, it is concluded that a 1% increase in the per capita GDP growth increases the foreign direct investments by 4.222027%.

Foreign direct investments play a very important role in achieving economic growth. This is especially important for underdeveloped countries. The fact that underdeveloped countries do not have sufficient capital makes it difficult to make investments. Investments planned to be made will have to be financed by external borrowing, as sufficient capital cannot be found. Another way of making these investments is to ensure that foreign investments inflow the country. Therefore, policy makers, especially in underdeveloped countries, need to work on how to ensure the inflow of foreign capital into the country. The results obtained in this article will guide policy makers on what should be done to increase the inflow of foreign capital into the country.

In the light of the information obtained, it has emerged that underdeveloped countries need to make their economic indicators attractive for investors in order to attract foreign direct investment to their countries. Foreign investment will decrease if GDP growth per capita remains below the calculated threshold. Therefore, policy makers must first take the necessary measures to increase the per capita GDP growth above the threshold value in order to increase the inflow of foreign direct investments into the country. If the economic indicators rise above this threshold value, those who will make foreign direct investments will also conclude that an economic environment of trust has been established in the countries and only then will underdeveloped countries be able to attract foreign direct investment.