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**The Nexus between Economic Growth and Foreign Direct Investment: An Empirical Approach**

**1.Abstract**

In this study, increased importance of foreign direct investment is tried to unveiled. The relationship between foreign direct investment and economic growth are examined controlling for the effect of six different economic growth determinants which are somewhat thought to be correlated with foreign direct investment. This association is investigated in Turkey via OLS method covering the period of 1970-2015. It turns out that FDI has positive effects on growth through its interaction with human capital.

**Keywords:** Economic growth, ordinary least square, foreign direct investment.

**2. Introduction**

Foreign Direct Investment (FDI) has gained increased importance since the globalization of the world markets. FDI, therefore, is a world-wide phenomenon in that not only developed countries but also developing as well as underdeveloped countries have attracted FDI progressively.

Foreign Direct Investment presents host countries the opportunity to promote their knowledge/products in international markets. Together with this, it enables an additional source of financing for new investment in host countries. Thus, FDI both promotes the transfer of technology and, via labor turnover and also attracts more source of financing which is a key requirement in particular for the countries with high current account deficit.

Liberalization of capital account in Turkey was the turning point for Turkey’s economy. Turkey, with high current account deficit and highly integrated market structure with the rest of the world, desperately needs for FDI. To this end, it is of considerable importance to address the issue of the magnitude and direction of the relationship between FDI and economic growth.

In this paper, it is aimed to explore the relationship between Foreign Direct Investment (FDI) and economic growth by controlling the effect of the eight most commonly perceived growth determinants: private credit, education, government consumption, inflation, democracy, and trade openness during the period from 1970 to 2014 in Turkey. This contemporary attempt to unveil the association between FDI and economic growth is done by controlling for the effect of some variable which are considered as important growth determinants in Turkey. So, the main contribution of this paper is the time covered and estimating FDI-economic growth relation by controlling for the Turkey-specific main growth determinants.

This paper outlines as follows. In the third part of the study, literature review on FDI- economic growth relation is provided. In the fourth part, methodology of the econometric model is introduced. In this part, it is discussed whether the econometric model corresponds to the theoretical framework. In the fifth part, data description as well as summary statistics are provided. In the sixth part, empirical result of the econometric model is presented. In the seventh section, possible extensions and limitations of the model employed are discussed. In the final section concludes.

**3. Review of Literature**

FDI is defined by Farrell (2008) as a combination of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market. Subsequent to the opening up the borders both for goods and services and for capital, there emerges large body of literature examining the relationship between FDI and economic growth. Carkovic and Levine (2002:195) discuss the surge in FDI:

“With commercial bank lending to developing economies drying up in the 1980s, most countries eased restrictions on foreign direct investment (FDI) and many aggressively offered tax incentives and subsidies to attract foreign capital. Along with these policy changes, a surge of noncommercial bank private capital flows to developing economies in the 1990s occurred.”

The relationship between economic growth and foreign direct investment remains unambiguous in that some studies reveal positive association but others do not. At this point it is worthwhile to review some important researches in the literature. Borensztein et al. (1998) provide theoretical support to the idea that FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy. In the same vein, Bengoa and Sanchez-Robles (2003) find positive nexus between FDI and economic growth by incorporating human capital of the host country.

Manuchehr and Ericsson (2001) is found positive association between FDI and economic growth by using lag-augmented vector autoregression between 1970-1997. Nair Reichert and Weinhold (2001) examine 24 developing countries and conclude that FDI on average has a significant effect on growth. After investigating 47 developing countries between 1981- 1999, Shaikh (2010) reveal that FDI in manufacturing sector and economic growth goes hand in hand. Schoors et al. (2002) states that at early stages of the development, FDI may have a negative impact on the economic growth. It was, however, stated by Alfaro (2003) who examined 47 countries between 1981-1999, that FDI inflows in manufacturing sector do bring positive effect on growth.Finally,Khaliq and Noy (2007) states that FDI and economic growth is negatively related in Indonesia during 1998-2006.

As it is apparent, there is no consensus on the relation between FDI and economic growth in the literature. This unambiguity occurs partly due to the factors with which FDI are interacted in explaining economic growth. To be more precise, variables such as human capital, trade openness, education etc. cannot be handled independent from FDI. Therefore, in order to properly unveil the relationship between FDI and economic growth, some other factors should be taken into account as well.

This disagreement arises partly due allocation of FDI to the sectors in an economy. Roughly speaking, once country invites foreign direct investment to the high value added sectors having potential to boost economy, it is highly likely that there emerges positive relation between foreign direct investment and economic growth and vice versa. This is because high value added sector can create positive spillovers that multiply the impact of the resources provided by foreign direct investment. To this end, Hausman and Arias (2000) classify FDI as good cholesterol (brings with it technology, managerial skills and market access and thus accelerates growth and development) or as bad cholesterol (debt, especially of the short-term variety). To them, ambiguity of the relationship between economic growth and FDI arises since the purpose(s) of FDI flows into the country is unknown.

It is, therefore, important to allocate FDI in an effective way to create spillover effect in an economy. Moreover, in order to explore the relationship between FDI and economic growth, it does not make sense to consider FDI as the single independent variable. It is known that FDI is in interaction with factors such as human capital, investment, economic stability, institutions, trade openness.

Borensztein et al. (1998) and Li and Liu (2005) examine the FDI and economic growth by controlling for the effect of the level of human capital and they find positive relation between FDI and economic growth.

Another study by Alfaro, Chanda, Kalemli-Ozcan and Sayek (2004) reveal positive association between FDI and economic growth by controlling for the financial market developments. In this sense, I use credit and trade openness as proxy for financial market development.

Quality of the political environment is another variable which is considered somewhat correlated with the FDI. Solomon (2011) study the effect of FDI on economic growth by controlling for the effect of quality of the political environment. Democracy is employed as the proxy of quality of the political environment in this study.

Other factor that attracts FDI into a country is the well-being of the domestic demand. In the absence of domestic demand, FDI cannot be enticed into a country as there is no market to sell products. So, it is considered that consumption and inflation are two important indicator of the situation of the national economy.

Therefore, in this study, in order to reveal the relation between FDI and economic growth properly, factors such as human capital, investment, democracy, credit, trade openness, education, consumption, and inflation are controlled for which are somewhat correlated with FDI. Hence, thanks to the inclusion of all these control variables, time period of the study, and its application to Turkey, it is believed to shed light not only on academic discussion but also on the economy policy.

**4. Methodology**

In this study, the relationship between foreign direct investment on economic growth is examined in Turkey over 1970-2015. In this regard, the model employed should be time series in that I only have one country and a time period. To this end, Ordinary Least Squares method will be applied.

gt=a0+a1fdit+ a2øt + εt

where gt represent GDP (constant 2010$) growth at time t, fdi stands for logarithmic value of foreign direct investment as a percentage GDP, øt is used for control variables. Control variables are the logarithmic value of private credit, logarithmic value of education, logarithmic value of government consumption as a percentage of GDP, logarithmic value of GDP deflator (inflation), logarithmic value of democracy, and logarithmic value of trade openness which is the average of export and import as a percentage of GDP and finally εt is the disturbance term.

Coefficients a1 and a2 define the output elasticity with respect to FDI and other variables frequently considered as additional determinants of growth.

**5. Data Description and Summary Statistics**

Economic growth is measured by GDP (constant 2010 US$) growth gathered from World Development Indicators (WDI). Foreign Direct Investment (FDI) is represented by inflows and collected from WDI Statistics. Inflation and government consumption, measured as the percentage of change in the GDP deflator and used as a proxy for macroeconomic stability as well as robustness of the Turkish economy was gathered from WDI as.

Trade openness is basically the average of export and import as a percentage of GDP. Private credit is proxied by domestic credit to private sector as a percentage of GDP. Secondary school attainment is used to represent human capital which is collected from Barro-Lee dataset.

Finally, democracy is extracted from Polity IV project. Polity IV dataset represents institutional framework and includes different states across globe. Differently, 164 countries which have at least a population of 500,000.

In the Table-1 below, summary descriptive of the variables are provided. Accordingly, mean GDP growth of Turkey between 1970-2015 is around 1,8% with minimum of -0,25% and maximum of 4.3%. Mean of FDI as a percentage of GDP is nearly 18% with a maximum of 68%. It seems that democracy and openness has fluctuated during the examination period of 1970-2015 which is expected as the globalization has become a common phenomenon as 1980. In parallel with this development democracy has been rooted especially in developing countries.

**Table-1: Summary Statistics**

**Mean Standard Dev. Min Max**

Growth .017949 .0172799 -.0254767 .0432097

FDI .1856717 .1843077 .00601 .681414

Democracy .907039 .1621242 .4771213 1

Credit 1.345934 .1646965 1.164007 1.811515

Openness 23 13.13393 1 45

Education .9953795 .2290436 .7126497 1.365113

Consump. 1.092589 .070874 .9302098 1.213232

Inflation 1.469054 3906723 .7989503 2.142905

Observation45

**6. The Empirical Application**

**6.1. Pre-Testing**

In this stage, unit root test is applied and presence of multicollinearity is checked before running the regression so that in the presence of unit root and/or multicollinearity, some adjustments are required.

**6.1.1. Unit root test**

It is very common to observe that a macroeconomic variable increase or decreases over time. This downward or upward trend in time amounts to non-stationary. A time series, xt, is defined to be stationary when distribution shows time-invariant characteristics. This is another way of saying that mean and variance of the distribution stays as it is. Non-stationary series can be mathematically described as:

Xt=Xt-1+εt

where Xt and Xt-1 value of the variable at time t and t-1 and εt random walk component.

There are two types of non-stationarity which are trend non-stationarity and difference non-stationarity. In the presence of trend non-stationarity, its remedy is to detrending it whereas in the case of difference non-stationarity, taking difference can make the data stationary.

In this study, Phillips–Perron (PP) unit-root test is applied to check the presence of unit root. Series contains a unit root is the null hypothesis and variable extracted from a stationary series is checked by alternative hypothesis.

Foreign direct investment, domestic credit to private sector, trade openness, human capital, government consumption, and inflation are found to be non-stationary and first difference is taken to make them stationary.

**Tablo-2:** Growth Stationarity Test

|  |  |  |
| --- | --- | --- |
|  | t-statistics | p-value |
| Philip Perron test statistics | -43.055 | 0.0000 |
| %1 level | -18.492 |  |
| %5 level | -13.108 |  |
| %10 level | -10.580 |  |

**Tablo-3:** Foreign Direct Investment Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | -3.801 | 0.6399 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

**Tablo-4:** Democracy Stationarity Test

|  |  |  |
| --- | --- | --- |
|  | t-statistics | p-value |
| Philip Perron test statistics | -20.569 | 0.0088 |
| %1 level | -18.492 |  |
| %5 level | -13.108 |  |
| %10 level | -10.580 |  |

**Tablo-5:** Private Credit Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | 1.681 | 0.9887 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

**Tablo-6:** TradeOpenness Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | -6.611 | 0.2404 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

**Tablo-7:** Education Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | -0.613 | 0.9127 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

**Tablo-8:** Consumption Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | -5.090 | 0.5849 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

**Tablo-9:** Inflation Stationarity Test

|  |  |  |  |
| --- | --- | --- | --- |
|  | t-statistics | p-value | p-value (After first differencing) |
| Philip Perron test statistics | -4.579 | 0.5285 | 0.0000 |
| %1 level | -18.492 |  |  |
| %5 level | -13.108 |  |  |
| %10 level | -10.580 |  |  |

As is seen from the stationary table above, some variables have non-stationary characteristics. Therefore, I take the first difference to obtain stationary data and the p-values are provided in the far-right column above.

**6.2. Multicollinearity**

Multicollinearity defined as the correlation of two or more variables, is a phenomenon frequently occur in the regression analysis.

Possible detection methods of multicollinearity are as follows:

* In the case estimated coefficient varies from model to model
* While F-test for all estimated coefficients are statistically significant but t-test does not.
* Correlation among independent variables are large which is 80% as a rule of thumb.

As is seen from correlation table below, correlation coefficient of between openness and inflation is above 80%. So, these variables do not enter into regression simultaneously. There are other high correlations among some variables such as private credit and inflation and government consumption and trade openness. However, though these variables are highly correlated, it does not imply that there exists multicollinearity among these variables. So all variables except for openness and inflation can be entered into the regression simultaneously.

**Table-10: Multicollinearity**

Growth FDI Democ. Credit Open. Human Cap. Gov. Cons. Inflation

1.0000

FDI 0.0678 1.0000

Democracy -0.0583 0.0417 1.0000

Pri. Credit 0.2609 0.0061 -0.0450 1.0000

Openness -0.3717 0.2529 0.1550 -0.4314 1.0000

Human Cap. -0.0981 0.0733 0.0568 0.1709 -0.1805 1.0000

Gov. Cons. 0.2082 -0.1151 0.2169 0.1878 -0.2390 0.1535 1.0000

Inflation -0.3669 0.1702 0.1173 -0.5180 **0.9094**  -0.1630 -0.2132 1.0000

**Autocorrelation**

It is commonly encountered issue in time-series analysis. Autocorrelation basically means correlation of error terms over time. This problem leads to following issues (PennState Eberly College of Science, 2017):

* Unbiasedness property of estimated coefficients do still hold but as in heteroscedasticity estimated coefficients are not BLUE due to lack of efficiency.
* True error variance may be well below shown in MSE
* True standard deviation of the estimated coefficients suppressed by the standard error of the estimated coefficients
* Making inference and intervals cannot be applicable anymore.

To properly detect autocorrelation, autocorrelation plot are provided in the appendix. In shaded region of the autocorrelation plots represent the 95% confidence interval. If the autocorrelation of related lag of the data is inside this region, it amounts to no autocorrelation in the data.

**6.3. Granger Causality**

Granger causality is a tool to examine causalitybetween two variables in a time series. The method is a [probabilistic](http://www.statisticshowto.com/probabilistic/) account of causality; it employs data sets to figure out whether it is [correlation](http://www.statisticshowto.com/what-is-correlation/) between the variables.

Before moving the regression, it is important find the causality between the economic growth and FDI. In this sense, Granger causality is applied and results are revealed in Table-11. Results show that FDI Granger cause economic growth at 5% significance level. Differently, FDI explains economic growth so using FDI is empirically makes sense.

**Table-11: Granger Causality**

|  |  |  |
| --- | --- | --- |
| **Equation** | **Excluded** | **Prob > chi2** |
| Growth | FDI | 0.858 |
| FDI | Growth | 0.013 |

**6.4. Results of the Regression and Interpretation**

In this part, result of the empirical analyses as well as its interpretation is provided. As discussed above, inflation and education has multicollinearity problem so that I first drop the inflation variable and continue the analyses by considering education. Then inflation variable included and education is disregarded.

Table-12 reveals the regression result and it is observed that inflation are the only variables which have statistically significant effect on economic growth. FDI has positively related with economic growth but it is not statistically significance at conventional levels.

However, inflation has negative impact on economic growth which can show the lack of competitiveness of the domestic sectors in Turkey. In the early stage of the economic globalization, opening up borders might not good for a country in that its domestic producers might not ready to compete with foreign companies. This might provide explanation of the negative association between trade openness and economic growth in Turkey.

In the second panel of the regression results, inflation variable is excluded and openness is included so that the we are able to highlight the impact of openness on the relationship between foreign direct investment and economic growth. In the second regression, FDI and trade openness have statistically significant estimated coefficients. 1-point increase in FDI promotes 3,81% increase in economic growth.

This emphasizes the importance of openness in explaining the relationship between foreign direct investment and economic growth. Therefore, if a country is integrated into the rest of the world, it can be concluded that FDI inflow is directed into the productive sectors which boost the economic growth as theory suggests.

**Table-12: Regression Results**

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
| Variables | growth | growth |
|  |  |  |
| d\_FDI | 0.0315 | 0.0381\* |
|  | (0.0187) | (0.0212) |
| democracy | -0.00523 | -0.00282 |
|  | (0.0145) | (0.0128) |
| d\_consumption | 0.0975 | 0.0871 |
|  | (0.0818) | (0.0849) |
| d\_credit | 0.0258 | 0.0330 |
|  | (0.0562) | (0.0576) |
| d\_inflation | -0.0329\* |  |
|  | (0.0176) |  |
| d\_education | -0.0621 | -0.0671 |
|  | (0.0513) | (0.0507) |
| d\_openness |  | -0.000960\*\* |
|  |  | (0.000447) |
| constant | 0.0226\* | 0.0208\* |
|  | (0.0126) | (0.0110) |
|  |  |  |
| Observations | 44 | 44 |
| R-squared | 0.218 | 0.192 |

Robust standard errors in parentheses. Dependent variable is logarithmic value of GDP growth. d\_FDI ise the first difference of logarithm of foreign direct investment as a percentage of GDP. Democracy is the logarithmic value democarcy index of Polity-IV dataset. d\_credit is the first difference of logarithm of private credit. d\_openness is the first difference of logarithm of average of export and import as a percentage of GDP. d\_education is the logarithm of years of secondary school attaintment. d\_inflation is the logarithm of GDP deflator. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Conclusion**

This study attempts to uncover the relationship between FDI and economic growth in Turkey during 1970-2015. In the light of the theory, it is known that there are some variables which are somewhat correlated with the foreign direct investment. Controlling for these variables helps researcher to properly explore the association between foreign direct investment and economic growth. In this study, human capital, investment, democracy, credit, trade openness, education, consumption, and inflation are controlled for and it turns out that foreign direct investment is positively related with the economic growth via the interaction of trade openness.

**References**

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of international economics*, *64*(1), 89-112.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of international economics*, *64*(1), 89-112.

Bengoa, M., & Sanchez-Robles, B. (2003). Foreign direct investment, economic freedom and growth: new evidence from Latin America. *European journal of political economy*, *19*(3), 529-545.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? 1. *Journal of international Economics*, *45*(1), 115-135.

Carkovic, M., & Levine, R. (2005). Does foreign direct investment accelerate economic growth?. *Does foreign direct investment promote development*, *195*.

Farrell, R. (2008). *Japanese investment in the world economy: A Study of Strategic Themes in the Internationalisation of Japanese Industry*. Edward Elgar Publishing.

Hausmann, R., & Fernandez-Arias, E. (2000). Foreign direct investment: good cholesterol?.

Li, X., & Liu, X. (2005). Foreign direct investment and economic growth: an increasingly endogenous relationship. *World development*, *33*(3), 393-407.

Irandoust, J. E. M. (2001). On the causality between foreign direct investment and output: a comparative study. *The International Trade Journal*, *15*(1), 1-26.

Iqbal, M. S., Shaikh, F. M., & Shar, A. H. (2010). Causality relationship between foreign direct investment, trade and economic growth in Pakistan. *Asian Social Science*, *6*(9), 82.

Khaliq, A., & Noy, I. (2007). Foreign direct investment and economic growth: Empirical evidence from sectoral data in Indonesia. *Journal of Economic Literature*, *45*(1), 313-325.

Nair‐Reichert, U., & Weinhold, D. (2001). Causality tests for cross‐country panels: a New look at FDI and economic growth in developing countries. *Oxford bulletin of economics and statistics*, *63*(2), 153-171.

Schoor, K., & van der Tool, B. (2002). The productivity effect of foreign ownership on domestic firms in Hungary, working paper. 157, University of Gent.

Solomon, E. M. (2017). Foreign direct investment, host country factors and economic growth. *Ensayos Revista de Economía (Ensayos Journal of Economics)*, *30*(1).

**Appendices**

**Appendix-1: Data Descriptions**

|  |  |  |
| --- | --- | --- |
| Variables | Definition | Sources |
| GDP per capita | GDP (constant 2010 US$) | World Development Indicator (World Bank) |
| Trade Openness | Openness is defined as the sum of export and import as a percentage of GDP. Mathematically,  Export+Import/GDP | World Development Indicator (World Bank) |
| Democracy | Institutionalized Democracy: Democracy is conceived as three essential, interdependent elements. One is the/ presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Second is the existence of institutionalized constraints on the exercise of power by the executive. Third is the guarantee of civil liberties to all citizens in their daily lives and in acts of political"" participation. | Marshall, Jaggers, and Guit (2010)-Polity IV Project |
| Government Consumption | General government final consumption expenditure (current US$) | World Development Indicator (World Bank) |
| Foreign Direct Investment | Foreign direct investment (FDI) is defined as an investment involving a long-term relationship and reflecting a lasting interest in and control by a resident entity in one economy. FDI inflows and outflows comprise capital provided (either directly or through other related enterprises) by a foreign direct investor to a FDI enterprise, or capital received by a foreign direct investor from a FDI enterprise. Inward and outward foreign direct investment flows, annual, 1970-2010. | World Development Indicator (World Bank) |
| Education | Secondary school enrollment with the adjusted gross enrollment rate method-% | Barro and Lee v.1.3 |
| Inflation | Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. | World Development Indicator (World Bank) |
| Credit | Domestic credit to private sector (% of GDP) | World Development Indicator (World Bank) |

**Appendix-2: Observing the autocorrelations of the variables**

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