

Long Term Relationship between Foreign Direct Investment and Economic Growth

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Abstract. In theory, foreign direct investment (FDI) results in economic growth through capital injections and foreign technology and other factors that come with it and change the production function of the host state. However, in the literature, there remains an ongoing discussion as to whether FDI affects economic growth at all. Many studies carried out by prominent researchers did not confirm such a relationship or approved it conditionally. In the paper, aiming to contribute to this discussion, the author examined the panel data of 73 countries with the dynamic linear model (DLM). The research confirms that FDI results in economic growth in the long term only.

Keywords: long term relationship, foreign direct investment, economic growth.

1. Introduction

Foreign direct investment (FDI) was considered a significant factor in economic growth year-by-year. At the same time, though, the FDI is sensitive to the prospects of countries economic growth in the country and its economic policy in general. Governments, especially in developing countries, have always sought to attract as much FDI as possible in the hope that this will have a positive impact on income generation, the transfer of advanced technologies and the associated development of staff skills.

The neoclassical economists saw FDI as a funding source from abroad within the balance of payments. As a result, countries often focus on how to attract as much FDI as possible (without paying much attention to quality that a state might need).

On the other hand, there is no consensus in the scientific literature as to whether the FDI has a positive impact on economic growth. Some empirical studies do not detect such a link, others – confirm a positive effect of FDI on economic growth having met various conditions: population growth, the country's level of development, the country's openness to international trade, the level of labour qualification, etc.

This paper contributes to this ongoing discussion with the analysis of panel data of FDI and real GDP in 73 countries. Aiming at establishing the relationship between these two variables, the author employed the dynamic linear model and cointegration test for identification of long term relationship. The research found that unambiguously FDI results in economic growth in the long term only.

2. Literature review

Many definitions of foreign direct investment can be found in the scientific literature. However, foreign direct investment usually means investment by foreign companies or individuals in start-ups and joint ventures, including joint ventures or the development of cooperation with local enterprises. Despite many definitions, the simplest and clearest is FDI as defined by the OECD. FDI is a category of “cross-border investment by a resident in one economy (direct investor) in order to establish a long-term interest in an enterprise (direct investment enterprise) living outside the economy of the direct investor” (OECD, 2009).

Theoretically, FDI influences economic growth by accumulating capital and incorporating new costs and foreign technologies into the production function of the host country. However, the results of empirical research differ (Almfraji, M. A., and Almsafir, M. K., 2014). Several factors affect a country's economic performance and growth. Foreign direct investment has been observed and positive as a significant driver of economic growth. However, the role of FDI in economic development has been the subject of long debate. The FDI and economic growth

literature has so far yielded mixed results on whether FDI contributes to economic growth (Makiela, K., & Ouattara, B., 2018).

Some studies show that FDI has a positive effect on the economic growth of countries, although this relationship often depends on the specific characteristics of the host country (Blomstrom et al., 1994; Balasubramanyam et al., 1996; De Mello, 1997; Borensztein et al., 1998; Alfaro et al., 2004). However, much macroeconomic research suggests that FDI does not drive economic growth because host firms take over knowledge from foreign firms (Saltz, 1992; Carcovic and Levine, 2005; Lipsey, 2002; Kose et al., 2009; Herzer, 2012; Yalta, 2013; Feeny et al., 2014; Iamsiraroj and Ulubas 2015). In their literature review, Almfraji, MA, and Almsafir, MK (2014) observed several studies that revealed that long-term growth in host countries is driven by the diffusion of technology and knowledge from investing countries to host countries and its scale is driven by FDI and domestic investment complementarity and change. Analyzing data from BRICS countries, Agrawal, G. (2015) proposed that FDI and economic growth be shared in long-term relationships or integrated into the long-term group (group) level, as evidenced by the results of the Pedroni group cointegration test.

Makiela, K., and Ouattara, B. (2018) note that the overall picture of empirical evidence on the relationship between FDI and growth is provided by Iamsiraroj and Ulubasoglu (2015), who state that 43% of the 108 empirical studies surveyed. positive and significant effects, 17% negative and significant effects and 40% statistically insignificant effects.

In their literature review, Dkhili, H., and Dhiab, L. B. (2018) observed that FDI may even have the opposite effect on economic growth in a trade-restrictive environment. For example, Borensztein et al. (1998) showed that the extent of FDI in a host country depends on the availability of human capital reserves. This effect can be negative in countries with low levels of social capital. Iamsiraroj (2016) showed that the effects of the dominance of foreign firms can deter local firms from developing their activities. Other negative effects of FDI may be due to the excessive concentration of production on one particular product, which would lead to lower export prices and worsening the exchange conditions in the host country. In their review of the literature, Almfraji, M. A., and Almsafir, M. K. (2014) observed several studies that revealed that the impact of FDI growth is positive in export-promoting countries but negative in import-substituting countries.

In a recent literature review, Lasbrey, A., et al. (2018) concluded that most of the studies on the interaction between FDI and economic growth included in their review demonstrate that FDI has a positive impact on the host economy. A positive outcome undoubtedly depends on the host country's absorption capacity, the availability of human and physical capital and the important economic freedom of the host country. However, they acknowledged that some studies had come to the

opposite conclusion.

3. Data and Methodology

This study was based on collected annual data of FDI and real GDP from 73 countries around the world for the period 1992 to 2018. The study did not divide the countries according to any criteria, i.e. it was not relevant whether the states were economically advanced or developing.

For this study, the sample was taken based on only one measure – whether FDI and real GDP data of examined countries were complete for the period that was considered. For the period from 1992 to 2019, only 73 states met this criterion (Table 1).

Although the FDI endured a period of turbulent growth in the 1990s, it was only half the previous growth rate just before the great depression in 2006. Meanwhile, in the case of economic growth, this decrease has only observed in the last decade, i.e. after the great depression that occurred in 2008-2009.

Overall, on average, both FDI and real GDP growth rates have been decreasing significantly in all 73 countries (see Figures 1). However, it is quite apparent that FDI's growth rates started to decline substantially earlier than real GDP.

Table 1: Descriptive statistics of real GDP and FDI

	LOG(RGDP)	LOG(FDI)
Mean	24.51392	20.75976
Median	24.53349	21.0029
Maximum	30.69322	26.96048
Minimum	19.05238	-23.02585
Std. Dev.	2.455513	3.76372
Skewness	0.028604	-6.187624
Kurtosis	2.427064	72.43728
Jarque-Bera	28.23516	423677.2
Probability	0.000001	0
Sum	50106.44	42432.94
Sum Sq. Dev.	12318.45	28940.3
Observations	2044	2044

In a graphical comparison between FDI and real GDP, it is difficult to see that, in short to medium term, these two macro-variables are correlated with each other. For this reason, this investigation assumed that the correlation relationship between FDI and real GDP could be long-term and therefore difficult to trace by various methods that are focused on the identification and assessment of short-and medium-term relationships.

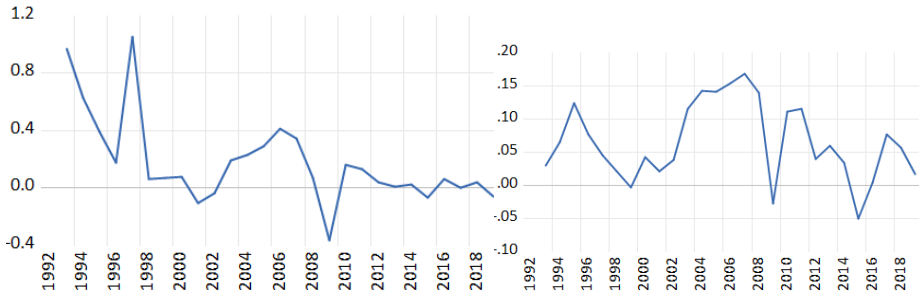


Fig.1: The growth of main tested variables: FDI and real GDP.

After FDI and real GDP data from 73 countries selected, the study aimed to determine whether these variables are linked by a long-term (has a cointegration relationship). For this reason, in this study, Pedroni, P. (2004) cointegration test based on Engle, R.F., and Granger, C.W.J. (1987) was used. Under the null hypothesis of no cointegration, the residuals e_{it} will be $I(1)$. The general approach is to obtain residuals and then to test whether residuals are $I(1)$ by running the auxiliary regression for each cross-section (Formula 1).

$$e_{it} = \rho i e_{it-1} + u_{it} \tag{1}$$

This study uses dynamic linear model (DLM), as Kalli, M. and Griffin, J. E. (2014) noticed, the problem of time-varying regressor effects could be addressed by using dynamics, which are a form of time-varying parameter models then the regression coefficients are evolved according to some stochastic processes. The model defines DLM discussed in West and Harrison (2006), or state-space models.

A dynamic regression (DR) model links a response y_t to regressors $x_{1,t}, \dots, x_{m,t}$ (all observed at time t) by:

$$y_t = \sum_{i=0}^m x_{i,t} \beta_{i,t} + e_t, \quad t = 1, 2, \dots, T, i = 0, \dots, m \tag{2}$$

where $x_{0,t} = 1$ for all t (allowing for an intercept), $\beta_{i,t}$ is a vector of unknown coefficients for the i th regressor at time t , e_t is the innovation term at time t generated from a normal distribution with zero mean and time-varying variance i.e. $e_t \sim N(0, \sigma_t^2)$. The regressors $x_{1,t}, \dots, x_{m,t}$ may include both lags of the response and exogenous variables. The DR model is completed by assuming that $\beta_{1,t}, \dots, \beta_{m,t}$ follow a linear stochastic process (such as a random walk or vector autoregression). This assumption is ensured by the transformation of time series taking differences in logarithmic scale.

It is expected that DLM can establish both short- and long-term relationships between examined variables. In order to obtain unbiased regression coefficients, cross-section and period effect were fixed and white period was chosen as for the coefficient covariance method.

4. Results and interpretation

A simple scatter plot analysis suggests that FDI and real GDP might follow long term relationship pattern – a cointegration relationship (Figure 2).

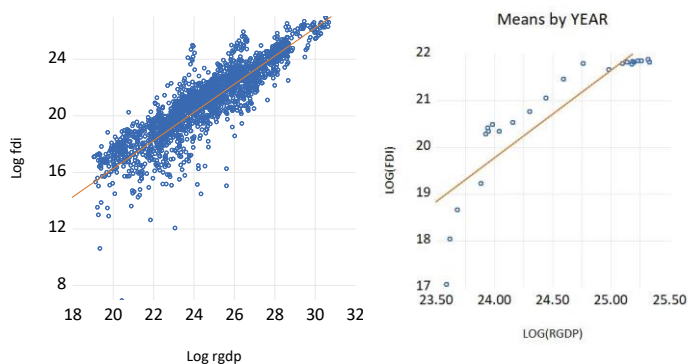


Fig.2: FDI and real GDP correlation and cointegration of 73 countries panel data.

Indeed, after Pedroni, P. (2004) cointegration test was applied, a cointegration was confirmed (Table 2a). However, because the results had been suspected to be affected by structural breaks, consequently the crisis periods were eliminated as follows: 1995, 2001 and 2008-2009. As a result of such adjustments, the impact of cointegration has not been identified (Table2b).

Table 2: The cointegration test results of panel data

	Statistic	Prob.	Weighted statistic	Prob.
Panel v-statistic	7.140726	0.0000	3.423782	0.000 3
Panel rho-statistic	-11.68024	0.0000	-15.55500	0.0000
Panel PP-statistic	-21.54815	0.0000	-17.40564	0.0000
Panel ADF-statistic	-18.13094	0.0000	-12.25963	0.0000

the years of crisis not excluded (a)

	statistic	Prob.	Weighted statistic	Prob.
Panel v-statistic	-3.182911	0.9993	-4.351802	1.0000
Panel rho-statistic	5.793727	1.0000	1.347047	0.9110
Panel PP-statistic	10.41585	1.0000	2.913678	0.9982
Panel ADF-statistic	-6.065556	0.0000	6.365708	1.0000

the years of crisis excluded (b)

The results of regression analysis are presented in Table 3. It shows that FDI impacts real GDP in the long term, i.e. after 11 years (see the results of the second equation). Though, the first regression demonstrates that there might be a short term relationship, the validity thereof is somewhat doubtful because probability is

nearby 0.05 ($p = 0.0423$).

The third regression equation of dependent variable *rgd* tested Cobb-Douglas function taking a first-order transformation of logs form. The results shows that real *gdp* negatively correlates with population growth that was occurred 7 years ago, gross capital formation and FDI that was monitored 16 years ago. However, total factor productivity affects real *gdp* at the same period.

Also, examination of labour productivity independent variables reveals that it depends on medium term *fdi* impact (after 5 years) and total factor productivity after up to 1 year.

Overall, this research results show that FDI affects economic growth, though probably in the long term only. In the author's view, the results of this study show that FDI affect real *gdp* indirectly – through investments in the growth of labour productivity.

Table 3. The panel data dynamic regression analysis results

Variables	dln rgdp	dln rgdp	dln rgdp	dln lpxr
Constant	0.056350 (0.002846)	0.061352 (0.003131)	0.073817 (0.007996)	0.016925 (0.000855)
dln rgp L^{-1}	0.156203 (0.023587)	0.197341 (0.027912)		
dln rgp L^{-2}			-0.099886 (0.032468)	
dln rgp L^{-4}				
dln pop L^{-7}			-2.869530 (0.883250)	
dln lpxr L^{-1}				0.122294 (0.07864)
dln gcfrm L^{-16}			0.033510 (0.013495)	
dln fdi L^{-3}	0.002505 (0.001233)			
dln fdi L^{-5}				0.001365 (0.000334)
dln fdi L^{-11}		0.003334 (0.001274)		
dln fdi L^{-16}			0.007463 (0.003926)	
dtfp			0.004647 (0.001539)	0.005813 (0.000216)
dtfp L^{-1}				0.000595 (0.000266)
Observations	1533	1022	670	1314
Number of id	73	73	67	73
Periods	21	14	10	18
Adj. R^2	0.2686	0.428021	0.384465	0.634828
DW stat.	1.8633	1.947289	1.664509	1.991735
Chow test/cross section F/p	0.51129	0.0490	0.0005	0.0000
Chow test/period F/p	0.0000	0.0000	0.0001	0.0000
Cross section	CE	Fixed	Fixed	Fixed
Period	Fixed	Fixed	Fixed	Fixed
Pesaran CD: statistic/p	-0.5922/0.55	0.19785/0.84	- 0.37919/0.7045	1.391/0.164

Also, it is worth noting that the slowdown in FDI growth rates over the last few decades might have led to a slowdown in economic growth over time. However, FDI is unlikely to be seen as the sole or primary reason for such slowdown in economic growth in 73 countries. Its negative impact cannot be ruled out, in the same way, having a long-term positive link between FDI and economic growth established.

5. Conclusion

Foreign direct investment has been observed and argued as a significant determinant of economic growth, though, the role of FDI in economic development has been the subject of lengthy debate. The FDI and economic growth literature have so far yielded mixed results on whether FDI contributes to economic growth or not. Some studies show that FDI has a positive impact on the economic growth of countries, although this relationship often depends on the specific characteristics of the host country. Though, what other empirical studies demonstrated is that FDI might even harm economic growth.

Such discrepancy in research results is partly written off to a variety of methods used or inequality of countries which data was examined.

Having expected FDI results in economic growth after some lags, this paper employed the dynamic linear model and found that FDI shocks affect real GDP growth in the long term only (after 14 years). Also, it is evident that a slowdown in economic growth that was observed after the Great depression followed a period of FDI slowdown.

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