Effect of Foreign Direct Investment on GDP

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Abstract: *This empirical research paper explores the effect of Foreign Direct Investment (FDI) on Gross Domestic product (GDP), across all types of countries. Based on past studies, the evolution of the relationship between Foreign Direct Investment and GDP consisted of varied opinions across researchers and was dependent of the country that was being analyzed. Ultimately, Foreign Direct Investment was said to have great advantages to host countries and was also relevant depending on other factors. The objective of this paper is to analyze the impact of FDI on poor, emerging and developed countries, in relationship to other factors affecting GDP. This paper evaluates the effect of Foreign Direct Investment on Gross Domestic Product across 160 countries between 2009 and 2018, using a panel data model. The additional variables that were deemed to have an effect on GDP included: the percentage of unemployment to total labor force (Modeled ILO Estimate), fixed broadband subscriptions, transport services, access to electricity and trade. The results of this study showcased a positive association between foreign direct investment and GDP. Based on my estimations, for every additional dollar towards Foreign Direct Investment, GDP is expected to increase by $20.58 on average*

I. Introduction

I shall begin by analyzing the concept of Foreign Direct Investment. Foreign Direct Investment is defined as a company's ownership of a business in a different country. Technically , it takes place when an individual or business owns at least 10% of a foreign company. Over the past few years, this type of investment has been considered valuable and has been an important economic growth factor for many countries. In fact, in 2018, according to the United Nations Conference on Trade and Development, global foreign direct investment had a value of $1.29 trillion and its highest number was of $2.03 trillion in 2015 (Brock, 2020). These values showcase the significance of foreign direct investment in the world and it is due to the investment's advantages such as the creations of jobs ,transfer of technology, access to global market and human capital formation. However, FDI may become a threat if the host country loses its comparative advantage or if all profits go to the investor's country. Another issue rose when it was seen that most host countries are developing and developed countries (Alfaro, 2003)

[Insert Graph 1 here]

Based on Graph 1, developed and emerging countries received the most FDI in 2016. For example, the United States received $479.4 billion in 2016 which is a high value compared to France with $42.3 billion. These 10 countries benefit the most from FDI while poor countries do not even make the list. From there, it is possible to understand that a country may need to be in a certain economical position in order to attract Foreign Direct Investment. As a matter of fact, in order to showcase the disparity in FDI between emerging and poor countries, in 2017, it was estimated that developing countries benefitted of $671 billion in FDI which represents 47% of total global FDI. As a result, based on past studies, the evolution of the relationship between Foreign Direct Investment and GDP consisted of varied opinions across researchers and was

dependent of the country that was being analyzed. Therefore, the objective of this paper is to explore the impact of FDI on poor, emerging and developed countries, in relationship to other factors affecting the GDP of a country. This paper will give adequate results of the relationship of FDI and GDP for all countries

Ultimately, Foreign Direct Investment was said to benefit both investors and host countries and this type of investment is a catalyst for economic growth, especially for developing countries. FDI also benefits less-developed countries but only when a proper business environment is provided. For example, the total stock of FDI in Nigeria was estimated at $98.6 billion in 2019, which coincides with Nigeria's GDP growth of 2.21% between 2018 and 2019 (World Bank, 2020) These results confirm my own observation that foreign direct investment has a positive association with GDP

II. Literature Review

Foreign Direct Investment has grown exponentially over the past few years and a large number of studies focused on the role of FDI as a stimulator of economic growth for specific countries. Since developing countries benefit the most from Foreign Direct Investment, most research were focused on the impact of this investment on emerging countries such as China or Bangladesh. From this research, a general idea of the relationship between FDI and GDP can be provided. As a result , some of the major studies are reviewed and discussed below

Borensztein et.al (1998) explored the relationship between FDI and GDP and he argues that foreign direct investment encourages the transfer of technology which has a positive impact on the growth of an economy. To explain his point of view, the author explored the relationship across 62 developing countries using a cross-country regression framework, from the past two decades. Foreign Direct Investment (FDI), as one important channel of technology transfer, helps

in the growth of the productivity levels for countries with a series of adequate policies and strategies. This advantage is specifically for developing countries because poor countries do not have the measures and the position needed in order for a transfer of technology to be successful. This is the reason why that Borensztein believes that FDI has a positive impact only if the host country has a minimum stock of Human Capital and has a certain technology available in order to benefit from the investor

Another study provided by Mottaleb, Khondoker Abdul (2007) also examined the relationship between FDI and GDP but this time by looking at the impact on both less developed and developing countries . The authors used a panel data from 60 low-income and lower-middle income countries and argued that those with larger GDP, higher GDP growth rate, business friendly environment and abundant modern infrastructural facilities, such as internet can successfully attract FDI which will affect the economic growth of a country. FDI enhances the access to foreign markets, increases competition and provides capital to host country. Therefore, in order for FDI to be effective, Abdul argues that FDI does not have a positive effect on all developing and less-developed countries and it can only stimulate the growth of a wealthy emerging one

As we have seen , past studies have argued that FDI is effective depending on the health of the economy of the host country. However, Laura Alfaro (2003) went further by looking at how sectors of an economy are impacted by FDI. Based on Alfaro, FDI flows into the different sectors of the economy (namely primary, manufacturing, and services) and have different effects on economic growth. Alfaro stated: “FDI inflows into the primary sector tend to have a negative effect on growth, whereas FDI inflows in the manufacturing and service sector a positive one” It

suggests that not all forms of foreign investment seem to be beneficial to host economies, which entails that FDI has its limitations

Finally, several other studies evaluate FDI, specifically to one country's GDP and provides another way of thinking about FDI. For example, Rahaman and Chakraborty (2015) concentrated their research on Bangladesh. Bangladesh is a developing country; however, it is not at the level of China. These two authors stipulate that it is imperative for national governments to create pre-conditions for FDI to flow in and work its wonders in Bangladesh. In order for FDI to be effective, the government needs to participate and help the country in order to attract investments and grow Bangladesh's economy. This strategy can be used by other developing countries in order to increase their productivity levels

Overall, these studies were varied, and different opinions emerged. However, they all concluded in the idea that foreign direct investment does have a positive impact in the GDP of certain countries

III. Empirical Model

The purpose of this empirical analysis is to determine whether FDI exerts an effect on a country's growth. Due to the structure and the components of the data, a Panel Data model with fixed options was used where the effect of FDI on GDP was evaluated across 160 countries between 2009 and 2018 . The data on the socio-economic factors of the sample for 160 countries have been taken from the World Bank. The empirical model takes the form:

$$\mathrm{GDP} = \beta_0 + \beta_1 \mathrm{FDI} + \beta_2 \mathrm{Energy}_{\mathrm{GDP}} + \beta_3 \mathrm{Unemptotal}_{\mathrm{ILO}} + \beta_4 \mathrm{Fxbroadh}_{\mathrm{Subs}} + \beta_5 \mathrm{Transp} + \beta_6 \mathrm{Elec}_{\mathrm{Access}} + \beta_7 \mathrm{Trade} + \mu$$

Where *GDP* is GDP per Capita, *FDI* is the percentage of net inflows of Foreign direct investment to GDP, $\text{Energy}_{\text{GDP}}$ is the energy use per $1,000 GDP in kg of oil equivalent, $\text{Unemptotal}_{\text{ILO}}$ is the percentage of unemployment to the total labor force (modeled ILO estimate), $\text{Fxbroadh}_{\text{Subs}}$ is the number of fixed broadband subscriptions (per 100 people), $Transp$ is transport services, as a percentage of commercial service exports, $\text{Elec}_{\text{Access}}$ is the percentage of the population that has access to electricity and Trade is trade as a percentage of GDP). This equation is linear which means that the slope is constant over the period for all variables.

Prior to the analysis of the data, based on my personal observations, I expected that *FDI*, $\text{Energy}_{\text{GDP}}$, $\text{Fxbroadh}_{\text{Subs}}$, $Transp$, $\text{Elec}_{\text{Access}}$, Trade to have a positive impact on a country's GDP and I expected $\text{Unemptotal}_{\text{ILO}}$ to have a negative coefficient

IV.Data Description

160 countries have been chosen in order to analyze the effect of Foreign Direct Investment on GDP and on Figure 1, these countries have been presented in order to provide a background for my research. This research is conducted based on primary data collected from the World Bank's Databank which presents for example, world development indicators such as FDI that impact all countries. DataBank is an analysis and visualization tool that contains collections of time series data on a variety of topics. Through this tool, I was able to create a map that showcased the impact of FDI on countries that are poor, emerging and developed, as presented on figure 1. [Insert Figure 1 here]

To explore my study, summary statistics were provided in regard to my equation model in Table 1. All the variables that I considered relevant were presented and the most important statistics have been provided for the purpose of the research [Insert Table 1 here]

In order to analyze the effect, it is important to present and define all the variables of my equation model.

In this research, the dependent variable is the GDP which stands for Gross Domestic Product. In this case, I used the GDP per Capita which measures the sum of marketed goods and services produced within the national boundary, averaged across everyone who lives within this territory (OECD,2019). The data is in constant US$. It is a primary measure of a country's economic productivity and is affected by many variables, including Foreign Direct Investment (Investopedia, 2020). In terms of my research, based on my statistics of the 160 countries in the 2009-2018 period, the maximum number of GDP per capita amounted to $90,029.36

The most important independent variable that is the focus of the research is Foreign Direct Investment (FDI). As we have stated before, Foreign Direct Investment is defined as a company's ownership of a business in a different country, with at least 10% of voting stock. In our research, it is given as a percentage of net inflows to GDP. Based on the World Bank, this variable is calculated by looking at net inflows in the reporting economy from foreign investors, divided by GDP

For the purpose of my research, other variables have been taken into consideration such as the amount of energy use per $1,000 GDP in kg of oil equivalent. This metric refers to the use of primary energy before transformation to other end-use fuels. It was taken into consideration because it is estimated that a country that consumes a significant amount of energy is prone to be industrialized which will end up with a higher GDP

The other variable that I believe affects GDP was the percentage of unemployment to the total labor force. It refers to the part of the labor force that is without work but available and looking for unemployment. Unemployment plays a huge role in GDP because I estimated that a

higher percentage of this variable will negatively impact a country's GDP. Also, based on past studies, a proper business environment is needed to attract FDI and this metric is used as one of the determinants of a country's economic position

An additional variable used was the number of fixed broadband subscriptions (per 100 people). Based on the World Bank, the fixed broadband subscriptions metric refers to fixed subscriptions to high-speed access to the public Internet , at downstream speeds equal to, or greater than, 256 kbit/s. It includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. It is estimated that a country with great technology and internet facilities is susceptible to have a higher GDP because it is able to access greater markets and is an important element in investment decisions for both domestic and foreign investors

Transport services, as a percentage of commercial service exports, was also utilized because it is expected to have a positive impact on a country's GDP. This variable looks at all transport services including sea, air, land, internal waterway, space, and pipeline and involves the carriage of passengers, movement of goods (freight), rental of carriers with crew, and related support and auxiliary services (World Bank) Transport services are part of a country's infrastructural projects and the more effective they are, I estimate that the GDP of a country will be higher

Two other variables that I estimated to impact a country's GDP is the percentage of the population that has access to electricity and trade as a percentage of GDP. In terms of electricity, it is an important measure because it is needed for human development and an economy's growth. A country needs electricity for businesses operations and human's basic needs. If everyone in a country do not have access to electricity, it is an indication of poverty. In terms of

trade, this variable is calculated as the sum of exports and imports of goods and services measured as a share of gross domestic product. I estimated that a higher percentage entails a higher GDP for a country

V. Results

Table 2 presents the main results of my research. On the basis of my findings, the major conclusion that can be drawn from the study is that Foreign Direct Investment has a positive effect on GDP. Access to electricity, transport services as a percentage of commercial service exports, and trade turned out to be insignificant variables [Insert Table 2 here]

I had estimated based on past studies and my observations that FDI has a positive association with GDP and my findings were able to confirm my hypothesis. From Table 2, it is observed that for every $1 inflow on Foreign Direct Investment, the GDP per Capita of the country will increase by $20.58 on average. This variable is statistically significant at 1% with an adjusted t-score of 4.48. I have also realized that the FDI only became significant when other variables were added. When I run the model with only FDI as a variable, the impact on GDP was insignificant. However, when I included other significant variables such as energy use, number of fixed broadband subscriptions, and the percentage of unemployment to total labor force, Foreign Direct Investment became significant at 1%

My results coincide with past studies with the idea that FDI has a significant effect only when added with other variables. In this case, the most significant ones were energy use and percentage of unemployment at 1%. There was a positive association between energy use and GDP, however for unemployment, if it increases, GDP will go down by $294.68. The number of fixed broadband subscriptions was significant at 5% and entails that if this number increases by one unit, GDP will increase by $45.16. My conclusion is that with great infrastructure, low

unemployment and high energy use, a country's FDI will have a significant effect on its GDP. This relates to the idea that emerging and developed countries benefit the most from FDI because they possess these characteristics.

Trade, Access of Electricity, and Transport service seem to not have a significant effect on GDP when the other variables that I have chosen were taken into consideration, according to my model

VI.Conclusion

Based on my findings, I was able to confirm that Foreign Direct Investment has a positive association with the GDP of a country. To provide a background of my research, I gathered data on World Bank DataBank and did my observation on 160 countries, including poor, emerging, and developed countries. From my observation, I found out that an increase in Foreign Direct Investment by $1 will increase the GDP per Capita of a country by $20.58. These results matched my expectation of a positive relationship between FDI and GDP. I was also able to confirm that FDI only has a significant effect when other variables are taken into consideration specifically: energy use, unemployment ratio and the number of fixed broadband subscriptions

When a country has great energy use, a low unemployment level and high number of fixed broadhand subscriptions, it will be able to attract FDI which will increase GDP. This argues that a certain economic position is needed for a country in order for FDI to be significant. My research goes along with past studies provided by Borensztein and Abdul who concluded that emerging countries benefit from FDI the most. My findings were limited since I did not account for all variables that have an impact on GDP and trade, transport services and access to electricity turned out to be insignificant variables. I was not able to perform an heteroskedasticity

test due to the nature of my data. Since my data is limited, I warn the government if my research was ever to be used for policy making

One shortcoming of this study is that I was not able to analyze the direct effect of FDI on low-income countries and my study does not provide a solution in order for poor countries to attract FDI. While emerging countries benefit from FDI, it will be great if further studies would look at how poor countries can benefit from Foreign Direct Investment since it has such a great impact on GDP

VII. References

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VIII. Graphs, Figures and Tables

Graph 1

Top 10 Countries That Received the Most Foreign Direct Investment in 2016

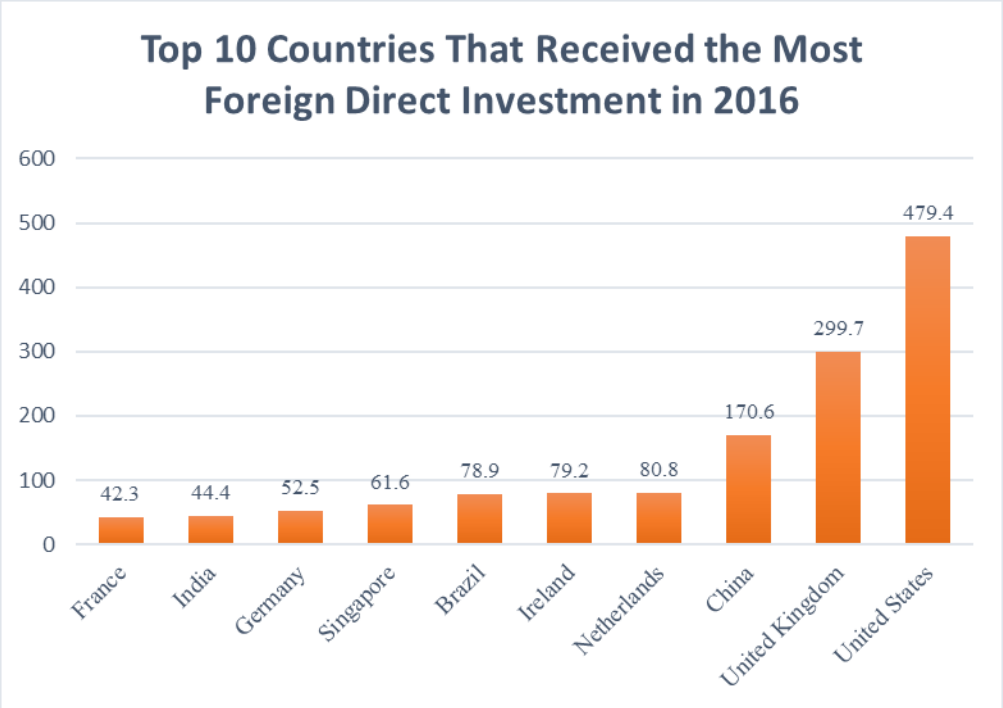

Figure 1

160 countries affected by Foreign Direct Investment

Table 1

Summary Statistics

Variable Name	Observations	Mean	Std. Deviation	Maximum	Minimum
GDP	706	$16,177.30	$19,030.67	$90,029.36	$334.02
FDI	706	6.12	19.27	280.13	(15.84)
ENERGY_GDP	706	2,350.61	2,331.42	17,922.73	1.00
UNEMPTOTAL_ILO	706	8.27	5.92	32.18	0.20
FXBROADH_SUBS	706	12.79	12.58	44.60	0.00
TRANSP	706	25.84	16.11	80.48	0.15
ELEC_ACCESS	706	87.02	23.26	100.00	11.20
TRADE	706	89.44	54.25	442.62	0.17

Table 2

Main Results

Variables	Original Models						
GDP	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII
FDI	3.37	21.42 ***	20.04***	20.48***	21.14 ***	21.10 ***	20.58***
	(0.81)	(4.43)	(4.54)	(4.58)	(4.69)	(4.67)	(4.48)
ENERGY-GDP		1.03***	0.65***	0.64***	0.51 ***	0.52***	0.53***
		(5.98)	(4.05)	(3.95)	(2.65)	(2.71)	(2.71)
UNEMPTOTAL_ILO			(-278.496) ***	(-287.81)***	(-294.35)***	(-294.46)***	(-294.64)***
			(-11.77)	(-11.88)	(-11.78)	(-11.70)	(-11.58)
FXBROADH_SUBS				46.51 **	58.29**	48.78**	45.16 *
				(2.06)	(2.49)	(1.99)	(1.79)
TRANSP					0.9	1.06	1.98
					(0.11)	(0.13)	(0.23)
ELEC-ACCESS						(-23.79)	(-24.28)
						(-1.396)	(-1.37)
TRADE							4.32
							(0.99)
Obs	1473	793	787	765	723	719	706
Adj R^2	0.994	0.997	0.997	0.998	0.998	0.998	0.998
F-stat (p-value)	1702.66	2337.38	2802.86	2686.29	2654.44	2618.57	2580.98
	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial Correlation Test (DW Stat)	0.29	0.937	1.087	1.116	1.102	1.108	1.101

IX. Appendix

EViews Results

Dependent Variable: GDP
Method: Panel Least Squares
Date: 12/16/20 Time: 14:58
Sample (adjusted): 2009 2015
Periods included: 7
Cross-sections included: 119
Total panel (unbalanced) observations: 706

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18318.45	1777.375	10.30646	0.0000
FDI	20.58052	4.592007	4.481814	0.0000
ENERGY_GDP	0.538805	0.198438	2.715225	0.0068
UNEMPTOTAL_ILO	-294.6457	25.43391	-11.58476	0.0000
FXBROADH_SUBS	45.16861	25.21287	1.791490	0.0737
TRANSP	1.986854	8.323482	0.238705	0.8114
ELEC_ACCESS	-24.28497	17.67062	-1.374313	0.1699
TRADE	4.323047	4.359774	0.991576	0.3218

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

Root MSE	782.8980	R-squared	0.998305
Mean dependent var	16177.30	Adjusted R-squared	0.997918
S.D. dependent var	19030.67	S.E. of regression	868.2635
Akaike info criterion	16.53782	Sum squared resid	4.33E+08
Schwarz criterion	17.39033	Log likelihood	-5705.850
Hannan-Quinn criter.	16.86723	F-statistic	2580.988
Durbin-Watson stat	1.101283	Prob(F-statistic)	0.000000

	GDP	FDI	ENERGY ...	UNEMPTO...	FXBROAD...	TRANSP	ELEC AC...	TRADE
Mean	16177.30	6.115755	2350.612	8.266364	12.78583	25.83906	87.02443	89.43750
Median	7573.345	2.761520	1700.888	6.858000	8.489069	23.01825	99.74925	78.74960
Maximum	90029.36	280.1318	17922.73	32.17900	44.60243	80.48007	100.0000	442.6200
Minimum	334.0216	-15.83879	66.34200	0.200000	0.000000	0.148724	11.20000	0.167418
Std. Dev.	19030.67	19.27105	2331.420	5.923525	12.58480	16.10558	23.26444	54.24993
Skewness	1.549479	10.20996	2.430485	1.442317	0.678203	0.846377	-1.789311	3.087812
Kurtosis	4.803524	124.4918	12.41232	5.121802	2.106787	3.202846	4.940667	17.73793
Jarque-Bera	378.1875	446463.8	3301.159	377.2145	77.59137	85.50129	487.5144	7511.400
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	11421174	4317.723	1659532.	5836.053	9026.795	18242.37	61439.25	63142.88
Sum Sq. Dev.	2.55E+11	261818.3	3.83E+09	24737.14	111656.0	182869.8	381570.0	2074854.
Observations	706	706	706	706	706	706	706	706