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Investigating the Impact of FDI on Economic Growth in Latin American Countries from 2002 to 2022.

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Abstract

In the context of current increasing globalization, economic integration between countries is of extreme important. This has been driving cross-border investments by corporations, also known as Foreign Direct Investment (FDI). These investments have become a key driver of economic growth, technological advancement, and development. This study examines the impact of FDI on economic growth in Latin America from 2002 to 2022. By utilizing a fixed-effects regression model, the analysis accounts for control variables, including inflation, corruption control, education, trade openness, and political stability. The results indicate that FDI generally promotes economic growth in the region; however, the significance of its effectiveness is dependent on the regression model and groupings used in the analysis. The study highlights the importance of governance and human capital in enhancing the positive effects of FDI. Additionally, it is found significant disparities in the impact of FDI between richer and poorer countries within Latin America. The study also acknowledges its limitations, such as potential omitted variable bias, endogeneity issues, and data constraints. To address these limitations and enrich findings on this topic, future research should employ other econometric techniques, expand the dataset, and explore sector-specific impacts of FDI, and make use of different groupings. This research provides addition for the dialogue and the investigation into the dynamic interplay between FDI and economic growth in Latin America, offering valuable insights for policymakers and scholars.

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1. Introduction

Globalization has been considered one of the most valuable aspects of today's global economy since countries trade and depend on each other. Foreign Direct Investment (FDI) is an important and popular aspect of globalization, involving multinational companies which seek to expand to other countries. Therefore, FDI can be simply defined as an investment made by a firm or individual from one country to another country (OECD, 2024). FDI occurs when an investor acquires at least 10% of the voting power in a foreign company, indicating a lasting interest and significant influence over the management of the enterprise (IMF, 2009). It is also important to notice that FDI includes the creation of new enterprises or the acquisition of existing businesses abroad, contributing to international economic integration (OECD, 2008). Due to that, FDI is considered an important factor economic development, playing an important role in international markets.

The relationship between FDI and economic growth has been a topic of study for decades, based in the neoclassical growth theory, and complemented later by endogenous growth models. The neoclassical theory, proposed by Solow (1956), suggests that FDI contributes to economic growth by supplementing domestic capital, and therefore increasing the capital supply and boosting productivity. However, it is also suggested that the impact of FDI may decrease over time as the economy reaches a steady state. In contrast, endogenous growth theories, such as those developed by Romer (1986) and Lucas (1988), argue that FDI can have a better impact on economic growth by promoting innovation, technology transfer, and human capital development.

Economic growth is typically measured by the increase in a country's gross domestic product (GDP) or GDP growth rate. GDP represents the total value of goods and services produced in a country, and its growth rate is an indicator of economic development. A higher GDP growth rate is associated with better standards of life, increased employment, and a more stable economy.

Since the 1980s, Latin American countries have implemented significant reforms to attract more FDI (UNCTAD, 2009). From 2010 onwards, Brazil, Mexico, and Chile have consistently been the top recipients of FDI. In 2022, Brazil, accounted for 41% of the total FDI inflow of the region, being positioned as the fifth largest global destination for FDI (ECLAC, 2023). Mexico and Chile followed, receiving 17% and 9% respectively (ECLAC, 2023). Other big FDI receivers included Colombia, Argentina, and Peru. In Central American and Caribbean

nations, Costa Rica, and the Dominican Republic, have also experienced large FDI inflows, especially due to the investments in services and renewable energy sectors (ECLAC,2021). Even though the potential benefits of FDI in a country are known, the actual impact on economic growth, especially in Latin America remains uncertain. This paper seeks to address this ambiguity by analyzing this relationship in Latin American countries from 2002 to 2022. Therefore, the central research question of the paper is as follows:

What impact did Foreign Direct Investment (FDI) have on the economic growth of Latin American countries in the period 2002-2022?

The topic and research question addressed in this paper are of importance and relevance. From a social perspective, understanding the real effects of FDI on developing economies is fundamental. This can enlighten policymakers to design more effective strategies to optimize the benefits of FDI, and promote sustainable economic growth. Additionally, this paper contributes to the existing literature, which presents ambiguous findings regarding the relationship between FDI and economic growth. By focusing specifically on Latin American countries over a period of 21 years, this study provides insights into a region that has experienced economic transformations and varying levels of FDI and growth.

This paper is structured as follows: firstly, it is provided an explanation of background and current literature regarding the main variables and their interactions, along with the development of the hypotheses. After that, in section 3 the paper describes the data utilized, with its definitions and sources. This section additionally explains the of the model and methodology utilized to obtain answers to the research question. Subsequently, the results of regressions are presented. This is followed by the interpretation of the results, a discussion of the limitations of the research, and finally, section 5 contains the conclusion and final remarks.

2. Theoretical Framework

Foreign Direct Investment is commonly identified as an important driver of economic growth. This relationship has been student throughout the years by numerous researchers. Literature reveals varied conclusions based on different methodologies and contexts. This section of the paper will provide a wide literature review synthesizing key findings from previous studies and give a background to better understand how FDI could have influenced the economic growth in Latin American countries in the period of 2002 to 2022.

Firstly, it is important to understand that FDI is considered an important influence on technology transfer, which positively contributes to economic growth, especially when the host country has a high level of human capital (Borensztein et al., 1998). This is supported by Lim (2001), who finds that Foreign investment can attract high levels of domestic investment and introduce advanced technology. These, when interacting with host's human capital can lead to productive FDI, which boosts productivity and increases economic growth. Building upon that, Ajayi (2006) highlights the role of FDI in capital formation and productivity growth, showing its potential to stimulate domestic investment and enhance total productivity via technology transfer.

Consequently, integrating Foreign Investments into an economy can stimulate more economic development, contingent to the host's capacities. This highlights the importance of quantity and quality of forging investment in economic growth. Similarly, when FDI is accompanied by local investment, it promotes company development (Tan and Tang, 2016). That is because FDI can boost technology transfer, which leads to an increase in countries capital, because an increase in technology will improve productivity of the labor force of a country.

While some studies indicate positive effects of FDI on economic growth others suggest no significant impact or even negative effects in certain contexts. For instance, Borensztein et al. (1998) and Forte & Moura (2013) noted that low levels of human capital and technology absorption capacity can limit the benefits of FDI.

To examine this ambiguous relationship in the context of Latin America, the first hypothesis is developed:

Hypothesis 1: FDI positively and significantly impacted economic growth in Latin America from 2002 until 2022.

The following paragraphs will discuss different factors that might affect Foreign Direct Investment, but also the economic growth and development of a country.

Financial Markets and Absorptive Capacity

The ability of FDI to effectively influence economic growth is dependent on the host country's financial market and its absorptive capabilities. The effectiveness of FDI in promoting economic growth is contingent on the development of financial markets and the absorptive capacity of the host country. Alfaro et al. (2004) found that FDI promotes economic growth more effectively in economies with well-developed financial markets. Similarly, Hermes and

Lensink (2003) identified that a country with skilled workforce and developed financial system augments the positive impact of FDI.

Inflation

Inflation is one of the key macroeconomic variables that can influence the relationship of FDI and economic growth. High inflation increases uncertainty, decreases purchase power and can influence investment decisions. Fischer (1993) shows that high inflation rates are detrimental to economic performance because investors are less likely to commit to long-term projects in an unstable inflationary environment, leading to slower economic growth. This happens because high inflation rates reduce the real value of returns on investment, making it less attractive for both domestic and foreign investors (Tobin, 1965). Therefore, including inflation in a growth model is crucial.

Political Stability

Political stability is a crucial determinant of economic growth, as it creates a conducive environment for investment and economic activities. Political instability, characterized by frequent changes in government, social unrest, or violence, can deter foreign and domestic investment, disrupt economic activities, and ultimately hamper economic growth. Alesina et al. (1996) finds that countries with higher levels of political instability tend to have lower levels of economic growth. Similarly, Barro (1991) emphasizes that measures of political stability are positively related to growth rates. A more recent study by Jong-A-Pin (2009) finds that the instability of the political regime, one of political instability dimensions, has a significant negative impact on economic growth. Therefore, it is crucial to consider political stability when analyzing economic growth, especially in Latin America, where political conditions often experience peaks and disturbances (International IDEA, 2023; Americas Quarterly, 2023).

Control of Corruption

Still regarding governance indicators, control of corruption is also an important influence on economic growth. Corruption can distort market mechanisms, increase the costs of business, and discourage domestic and foreign investment. Mauro (1995) demonstrates that corruption negatively impacts investment and growth because it creates inefficiencies and leads to misallocation of resources. Additionally, Kaufmann and Kraay (2002) find a strong negative correlation between corruption and economic growth, suggesting that reducing corruption can

lead to significant improvements in economic performance. Building onto that, Cooray, Dzhumashev, and Schneider (2017) find that corruption negatively impacts economic growth via reduction of efficiency on the public sector and increasing transaction costs.

Further, Busse and Hefeker (2007) find that corruption significantly deters FDI inflows in developing countries. It is highlighted that reduced corruption can be crucial for attracting more FDI, which can positively impact economic growth by providing more stable capital inflows. Mauro (1995) additionally notices that corruption reduces the overall investment rate by acting as a tax on returns, which lowers the private marginal product of capital. This reduction in investment directly hampers economic growth. These findings show the importance of the improvement of institutional quality and governance to create a more favorable environment for investing and therefore promote economic development.

Trade Openness

Trade openness is also widely associated to economic growth. The level of openness of a country can facilitate access to larger markets, enhance competition, and support the transfer of technology and knowledge. Sachs and Warner (1995) demonstrates that open economies tend to grow faster than closed ones due to better resource allocation and increased efficiency. Moreover, evidence by Frankel and Romer (1999) show that trade openness positively correlates with income levels, supporting the view that trade liberalization promotes growth. In more recent studies, trade openness remains significant for economic growth. Dufrénot, Mignon, and Tsangarides (2010) show that trade openness leads to higher economic growth by improving resource allocation and enhancing productivity. Additionally, Baldwin and Forslid (2000) demonstrate that trade liberalization stimulates the development of the R&D sector and financial intermediaries. This development increases the quality of the production systems, promoting long-term economic growth.

Additionally, trade openness tends to attract (more) FDI because it creates an advantageous environment for investors due to lower barriers and more access to the market in host country. Higher openness can also increase FDI inflows via the reduction in costs and uncertainties. According to Liargovas and Skandalis (2011), trade openness is crucial for attracting FDI in developing countries. They suggest that by implementing policies which promote trade openness and ensuring political and economic stability, these countries can create a favorable environment for foreign investors, thereby stimulating economic growth.

Human Capital and Education

Education and human capital are additional drivers of economic growth and FDI attraction. Higher levels of education improve workforce potential, productivity, and cultivate innovation, all of which are essential for economic development. Barro and Lee (2013) highlight that countries with better-educated individuals tend to experience faster economic growth due to the enhanced capabilities of their labor force. In addition, Hanushek and Woessmann (2012) demonstrate that cognitive skills, as an outcome of good education, impact economic growth by increasing labor productivity and promoting technological advancements. Similarly, Cohen and Soto (2007) find that improvements in human capital, measured by investment in education, are associated with increased economic performance, emphasizing the importance of investing in education to create a skilled workforce. In addition, since foreign investors want to maximize productivity and gains, they are attracted to countries with a well-educated workforce (Noorbakhsh, Paloni, and Youssef, 2001). Consequently, a country with better educated and skilled workforce attracts and effectively utilize FDI for economic development.

The relationship between FDI and economic growth in Latin America is complex and influenced by various aspects, including governance factors (corruption and political stability), inflation, trade openness and human capital. While FDI has the potential to drive economic growth through technology transfer and increased productivity, its effectiveness depends on the host country's absorptive capacity and economic conditions. Understanding these relationships can allow Latin American countries to absorb and make the best use of the benefits of FDI for sustainable economic growth. Based of the variables and relationships explained above, the second hypothesis developed to guide the tests in this paper is:

Hypothesis 2: The impact of FDI on economic growth is moderated by the host country's characteristics, including political stability, control of corruption, inflation, trade openness, and education.

3. Data and Methodology

3.1 Data

In order to examine the effect of FDI on economic growth in Latin America, data was gathered mainly from The World Bank database, retrieved on 2024. This database provides World Development Indicators, and the information for the following variables from 2002-2022 was

collected: GDP, GDP growth, FDI inflows, Inflation, World Governance Indicators (Control of Corruption and Political Stability), and Trade as a percentage of GDP. Additionally, information from 2002-2022 on the variable “Expected Years of Schooling” was collected from the United Nations Development Programme, retrieved from the database Our World in Data. In Table 1, all variables, and their definitions according to the databases where they were gathered from are displayed.

Table 1
Variable definitions

Variable	Long definition
GDP	Sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Calculated in current U.S. dollars.
GDP Growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars.
Foreign Direct Investment	Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars.
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.
Political Stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).
Control of corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).
Trade openness	Sum of exports and imports of goods and services measured as a share of GDP.
Education - Expected Years of Schooling	Number of years a child of school entrance age can expect to receive if the current age-specific enrollment rates persist throughout the child's years of schooling.

Note: Definitions retrieved from Our World in Data (2024) and World Bank (2024).

Throughout this paper, the countries are divided among rich and poor countries. To categorize countries in this paper, the World Bank's classification system is utilized. For the fiscal year

2024, the World Bank classifies low-income economies as those with a Gross National Income (GNI) per capita of \$1,135 or less, calculated using the World Bank Atlas method for the year 2022. Economies with a GNI per capita between \$1,136 and \$4,465 are considered lower middle-income. Upper middle-income economies have a GNI per capita between \$4,466 and \$13,845. Lastly, high-income economies are defined as those with a GNI per capita of \$13,846 or more. These classifications help delineate the economic status of countries and facilitate comparative analysis within this study. To simplify the analysis, upper middle-income and high-income countries are merged as “Rich countries” and lower middle-income is merged with low-income countries, being classified as “Poor countries”. Following these definitions, countries are divided as follows:

Table 2

Countries division based on average GNI per capita over the years 2002-2022.

Rich countries	Poor countries
Argentina, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Uruguay.	Bolivia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay, Peru.

The listed countries sum up to 19 countries. These are the ones considered for all regressions and tests thought out the paper. The other Latin American countries not considered were excluded from the sample due to lack of data. The three richest countries are, in order, Barbados, Uruguay and Chile. The three poorest are, in order, Haiti, Nicaragua and Honduras. Table 3 below displays a summary of all variables utilized in this paper.

Table 3

Summary statistics

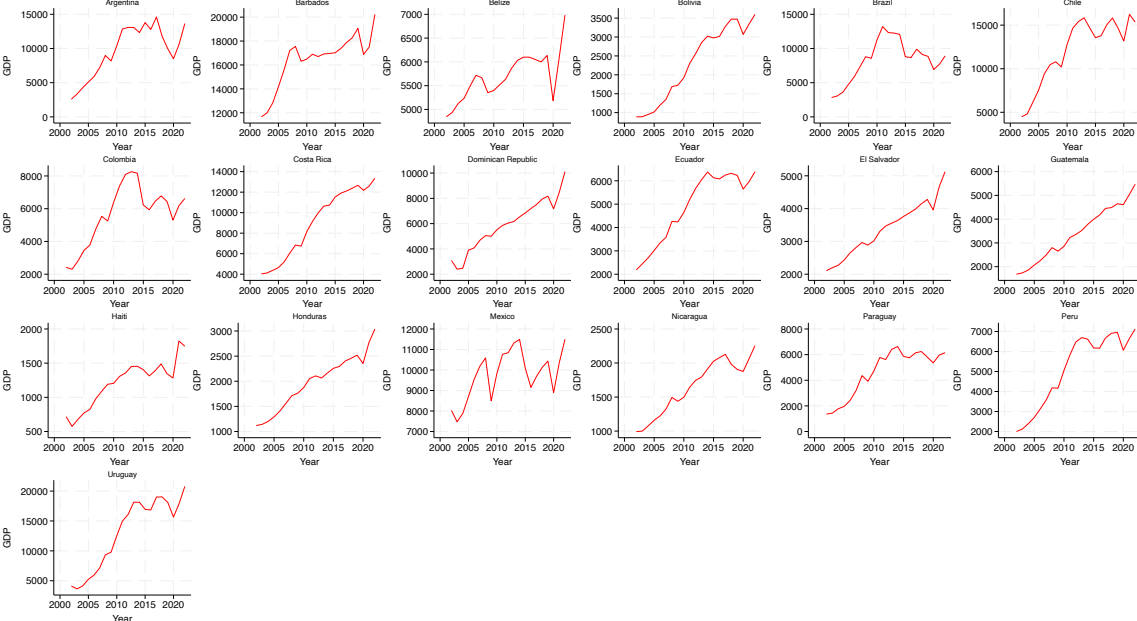
Variable	Observations	Mean	Std. dev.	Min	Max
FDI	399	7.09e+09	1.52e+10	-1.13e+09	1.02e+11
Ln FDI	390	21.07875	1.945854	14.86278	25.35242
GDP	399	6537.24	4745.405	575.5568	20795.04
GDP growth	399	3.032683	3.94609	-13.73169	17.86245
Political Stability	399	-0.1962921	0.679832	-2.376027	1.27792
Control of Corruption	399	-0.2659824	0.7950153	-1.584856	1.717748
Inflation	399	6.998941	7.892293	-4.620602	69.471224
Trade openness	399	64.27888	24.17242	22.10598	136.4898
Education	399	13.52546	2.077213	8.91728	18.97951

The logarithmic value of FDI is employed to normalize the distribution of FDI. Before this transformation, the FDI data was skewed, which could be a problem since it had the potential to distort the results for the tests and regressions. As indicated in Table 1, the variable Ln FDI has less observations than all other variables. That because there are nine observations which had negative FDI inflows in the given years. These are therefore not transformed to log since it is not possible to have the logarithm of a negative number.

Another interesting way to look at the data is by seeing the FDI and GDP throughout the years per country. Graphs that represent this are shown below in Figure 1 and 2 and 3. The graphical results display time series plots of, respectively, GDP, GDP growth, and the log of FDI for the selected Latin American countries from 2002 to 2022. These visualizations provide an initial understanding of the trends in these economic indicators over the study period.

Figure 1

Time series graphs of GDP over the years 2002 - 2022 for 19 Latin American countries.



The time series analysis of GDP for various Latin American countries from 2002 to 2022 reveals economic trends and patterns. Most countries demonstrate a general upward trend in GDP, reflecting overall economic growth. Countries such as Bolivia, Costa Rica, Dominican Republic, and Guatemala experienced a more steady and consistent growth, indicative of stable economic environments. In contrast, countries like Argentina, Brazil, Chile, Colombia, and Mexico experience fluctuations, highlighting periods of economic instability. Additionally, it is possible to see that there is a decrease in GDP in all countries in the year 2020. This could be

a consequence of the Covid-19 crisis. Moving forward, a similar figure below shows FDI inflows over the years for the 19 Latin American countries.

Figure 2

Time series graphs of GDP growth over the years 2002 - 2022 for 19 Latin American countries.

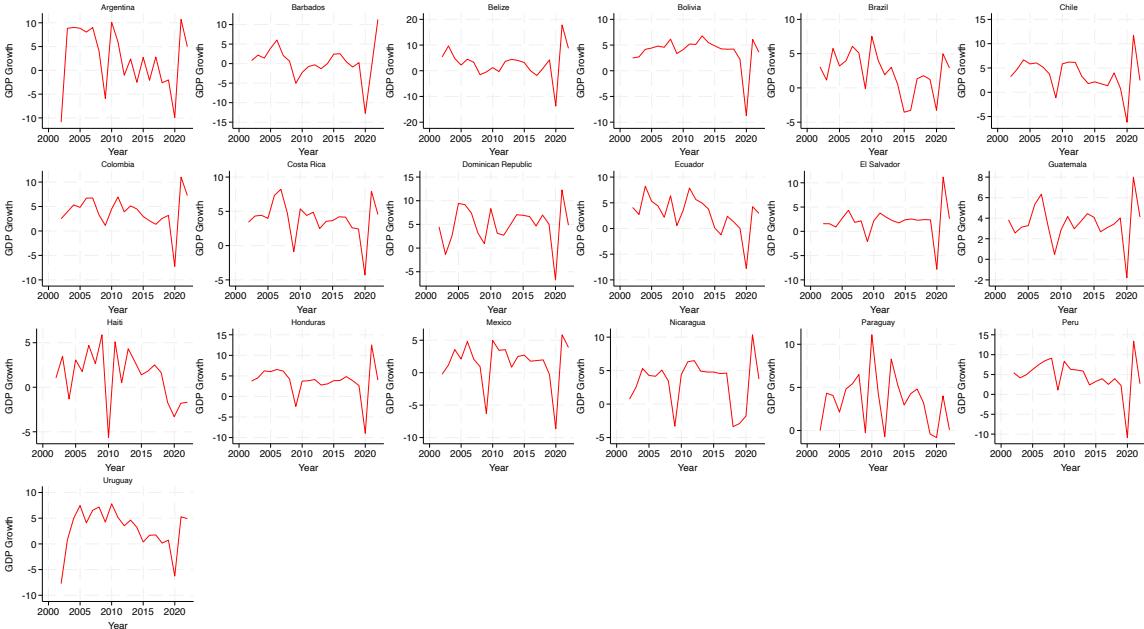
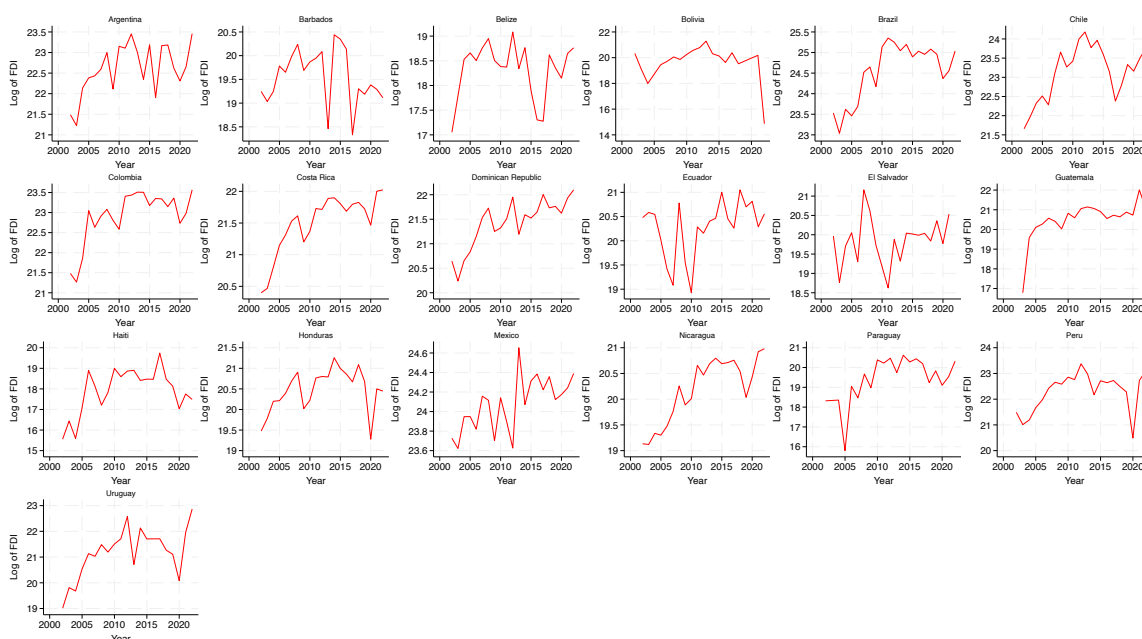


Figure 3 depicts the last set of time series graphs referring to the GDP growth percentage over the years by country. The graphs show diverse economic performance across the region. The GDP growth rates are unstable, with many countries experiencing frequent changes. This volatility is more evident in countries such as Argentina, Paraguay, and Mexico. Several countries show periods of negative growth, which could be associated with economic crises or global economic downturns.

Moving forward, Figure 3 is a similar set of plots below which shows the log of FDI inflows for each one of the 19 countries. The FDI inflows exhibit more volatility compared to GDP, with several countries experiencing significant fluctuations. Countries like Brazil, Chile, and Mexico consistently attract higher FDI inflows, which aligns with their larger economies and market attractiveness. Belize has the lowest maximum FDI attracted. However, countries such as Argentina, Barbados, Belize, Ecuador and Mexico show marked instability and volatility in FDI trends, likely reflecting periods of economic and political instability. In contrast, smaller economies like Costa Rica and Guatemala demonstrate more stable FDI inflows with less pronounced fluctuations.

Figure 3

Time series graphs of the Log of FDI over the years 2002 - 2022 for 19 Latin American countries.



In all three sets of graphs, a noticeable decrease in GDP, GDP growth and FDI for all countries on the year 2020 is evident. This can be a consequence of the Covid-19 crisis, which impacted global economies and investments, leading to reduction in global GDP and decrease in FDI flows. The pandemic caused a 5.2 percent decline in global GDP in 2020, marking it the deepest recession in decades (World Bank, 2020). This economic downturn affected output growth, employment, and international trade, particularly in emerging and developing economies, which have experienced persistent adverse effects (UN News, 2023).

By comparing the trends in GDP and FDI, we can observe that countries with higher and more stable FDI inflows tend to have higher GDP levels and growth rates. For instance, Brazil and Mexico show both higher FDI inflows and GDP growth. In addition, countries with more economic stability, detected by smoother GDP growth trends, tend to attract more consistent FDI inflows. Chile and Peru are notable examples. These findings will be further explored and quantified in the next sections of this paper, which will involve econometric modeling to quantify the causal impact of FDI on economic growth in the region.

3.2 Methodology

To provide a comprehensive understanding of the impact of FDI on economic growth over the years, this paper employs panel data analysis. The panel data setup allows to control for unobserved heterogeneity because it accounts for individual-specific characteristics that do not

vary over time. This is essential for isolating the impact of FDI on economic growth while controlling for other factors. Panel data follows the same individuals or groups over time, providing econometric benefits, such as larger sample size and variability, helping to enhance the reliability of estimators.

To explore the relationship between FDI and economic growth, fixed effects regression models are employed. These models control for time-invariant characteristics of the countries, by accounting for within-individual differences over time, thus providing more reliable estimates of the impact of FDI. Hence, there is no need to control further for time-invariant control variables. The main regression model is specified as follows:

$$\text{Economic Growth}_{it} = B_0 + B_1 * \text{FDI}_{it} + B_2 * \text{Inflation}_{it} + B_3 * \text{Political Stability}_{it} + B_3 * \text{Control of Corruption}_{it} + B_5 * \text{Trade Openness}_{it} + B_6 * \text{Education} + a_i + \epsilon_{it}$$

This model incorporates FDI and control variables including political stability, control of corruption, inflation, trade openness, and education. It aims to assess their combined effect on economic growth in Latin American countries over 21 years. In the regression, it is accounted for each country i in year t , with a capturing time-invariant characteristics and with ϵ being the error term. These are the chosen variables because as seen in previous literature, these factors influence both independent variable (FDI) and dependent (Economic Growth). In addition, since these variables are likely to not be fixed overtime and the econometric model of fixed effects only accounts for time invariant variables it is important to control for them. Therefore, control variables are added to decrease the potential misleading and biased results.

To understand the impact more comprehensively, regressions are conducted with both GDP and GDP growth as dependent variables. This allows for a more in-depth analysis of how FDI influences overall economic performance and its growth pattern over time.

Firstly, the entire sample is used, and regressions are done, with each (control) variable being added at a time to check for significances and differences within the different models, resulting in a total of six models, for both GDP and GDP growth. Additionally, separate regressions are performed for the two sets of countries defined by their economic status. Using the same model and methods as the main equations, the analyses are done separately for rich and poor countries. This allows for a better analysis of how FDI affects economic growth depending on the economic condition of the country. This differentiation is important since countries may experience different consequences of FDI based on their economic status and capabilities. All

regression models are identical to those used in the main analysis, ensuring consistency and comparability in the results.

To further investigate, the same tests are performed with the entire sample, but with the exclusion of the three countries with lowest average GNI (Haiti, Honduras, and Nicaragua). Removing these countries has the aim of getting clearer insights on the relationship and whether the countries distort the main previous results.

Additionally, based on the significant results for the full regression with GDP growth as dependent variable and excluding the three poor countries, regressions utilizing interaction terms are conducted. These aim to capture the combined effects of FDI with other critical variables (education and trade openness), it also looks at the combined effect of the interaction of both control variables and the impact of this interaction on the influence of FDI on economic growth.

Lastly, to ensure the validity of the results, robustness checks are conducted. Firstly, a multicollinearity check is done, calculating Variance Inflation Factors (VIF) to detect multicollinearity between the independent variables. High VIF values would indicate potential multicollinearity issues, necessitating model adjustments. Additionally, a heteroskedasticity check is performed, utilizing the Breusch-Pagan test. Heteroskedasticity refers to the presence of non-constant variance in the regression residuals. The test evaluates whether the variance of the errors is dependent on the independent variables. It is important to test it because if heteroskedasticity is present, there will be a violation of the main assumptions of the regression model, and this could potentially bias the results.

4. Results

In this section, the findings from all regressions and tests done to analyze the effect of FDI on economic growth of the Latin American countries over the years 2002 to 2022 are displayed. This section is divided into subsections to present separately the results from the different sample grouping types.

4.1 Results for All Countries

The results of the fixed effects regressions when all countries are together in the same sample group are shown in Table 4. The dependent variable is the annual percentage of GDP growth, and the main independent variable is Foreign Direct Investment. The models progressively

include control variables to observe the effects of FDI on economic growth and observe the differences when these controls are added.

Table 4

Fixed Effects regressions of effect of FDI on GDP growth for 19 Latin American Countries from 2002 to 2022.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	0.669*** (0.193)	0.571*** (0.172)	0.551*** (0.176)	0.534** (0.174)	0.492** (0.184)	0.554** (0.171)
Inflation		-0.119*** (0.020)	-0.117*** (0.020)	-0.119*** (0.021)	-0.128*** (0.025)	-0.124*** (0.297)
Political Stability			0.358 (0.674)	0.252 (0.681)	0.239 (0.689)	0.153 (0.648)
Control of corruption				0.674 (0.951)	1.267 (0.918)	0.908 (0.7866)
Trade openness					0.036* (0.016)	0.033* (0.153)
Education						-0.744* (0.332)
Constant	12.192** (4.438)	-9.300* (4.060)	-8.849* (4.038)	-8.335 (4.110)	-9.362* (4.226)	-1.343 (5.790)
Overall R-squared	0.566	0.591	0.591	0.592	0.597	0.428
Observations	390	390	390	390	390	390

*Note: Standard errors are in parenthesis. Statistical significance levels: * $p < 0.05$. ** $p < 0.01$ *** $p < 0.001$.*

The results indicate that FDI has a positive and significant effect on GDP growth in all models. There are slight decreases on the coefficient of FDI once more control variables are added. Inflation shows a negative and highly significant impact on GDP growth in all models. The governance indicators Political stability and Control of Corruption show positive impact on GDP growth; however, they do not exhibit significant effects. Trade openness exhibits a positive and significant impact on GDP growth in models five and six. Lastly, the variable education shows a negative and significant coefficient. In simple terms, an increase of FDI inflows lead to an increase in the percentage of economic growth in Latin American countries in the given years.

4.2 Results for Poor Countries

Now, dividing the sample based on Rich and Poor: the six models of fixed effects regressions result for the poor countries are displayed in Table 6. The effect of FDI on GDP growth is positive in all models, with a slight gradual decrease in the coefficient when there is addition

of control variables. The coefficients are not statistically significant in any of the models. Additionally, inflation has a negative significant effect regardless of the model and control variables added. The variables Political stability and control of corruption have a positive but not significant effect on GDP growth. Once the model includes trade openness, the variable is positive but not significant. Lastly, the education variable shows a negative significant coefficient, and when this variable is added, trade openness shows a positive significant coefficient.

Table 6

Fixed Effects regressions of effect of FDI on GDP growth for Poor Latin American Countries from 2002 to 2022.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	0.478 (0.311)	0.424 (0.270)	0.419 (0.278)	0.419 (0.276)	0.402 (0.264)	0.483 (0.302)
Inflation		-0.089* (0.030)	-0.087* (0.036)	-0.085* (0.034)	-0.095* (0.032)	-0.083* (0.034)
Political Stability			0.112 (0.910)	0.077 (0.920)	-0.025 (0.990)	0.408 (0.566)
Control of corruption				0.522 (1.1261)	1.571 (1.756)	1.275 (1.371)
Trade openness					0.048 (0.023)	0.054* (0.022)
Education						-1.197* (0.349)
Constant	-12.192** (4.438)	-9.300* (4.060)	-8.849* (4.038)	-8.335 (4.110)	-9.362* (4.226)	4.579 (5.117)
Overall R-squared	0.553	0.561	0.533	0.561	0.574	0.410
Observations	161	161	161	161	161	161

*Note: Standard errors are in parenthesis. Statistical significance levels: *p < 0.05. **p < 0.01 ***p < 0.001.*

To go a step further, the same regressions were done but instead of utilizing the annual growth percentage of GDP, it was utilizing actual GDP. The results for poor countries are shown below in Table 7. The coefficients for all variables, regardless of the model, are insignificant when testing the poor countries. Even though the results are not statistically significant, FDI shows a positive impact on GDP in poor Latin American countries.

Table 7

Fixed Effects regressions of effect of FDI on GDP for Poor Latin American Countries from 2002 to 2022.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	113.816 (128.178)	91.779 (105.448)	64.977 (104.775)	64.967 (106.064)	71.891 (102.265)	53.018 (89.823)
Inflation		-35.922 (26.120)	-27.710 (24.791)	-27.918 (22.186)	-23.858 (21.026)	-26.732 (21.771)
Political Stability			652.921 (567.313)	656.649 (576.556)	697.964 (529.215)	597.128 (501.947)
Control of corruption				-56.193 (1142.160)	-481.934 (1063.061)	-412.996 (1018.916)
Trade Openness					-19.602 (16.541)	-21.039 (15.196)
Education						278.850 (316.596)
Constant	-823.411 (2773.325)	-194.768 (2206.860)	643.777 (2108.378)	595.454 (2053.913)	1342.485 (2114.975)	-1291.015 (4598.389)
Overall R-squared	0.355	0.398	0.389	0.383	0.442	0.216
Observations	161	161	161	161	161	161

*Note: Standard errors are in parenthesis. Statistical significance levels: * $p < 0.05$. ** $p < 0.01$ *** $p < 0.001$.*

4.3 Results for Rich Countries

Moving to the second group, the rich countries, the results of the fixed effect regressions are displayed below in Table 8. It is shown that FDI has an overall positive impact in GDP growth. The results are significant in the first model, when no control variables are added. However, once inflation is added, the significance of the coefficient is diminished. The variable inflation is, just as in the previous results, negatively significant. The other variables remain showing non-significant coefficients, with governance factors and trade openness showing positive coefficients, and education a negative coefficient.

Table 8

Fixed Effects regressions of effect of FDI on GDP growth for Rich Latin American Countries from 2002 to 2022.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	0.678* (0.292)	0.491 (0.292)	0.469 (0.284)	0.454 (0.307)	0.431 (0.345)	0.517 (0.250)
Inflation		-0.129* * (0.030)	-0.128** (0.030)	-0.130** (0.033)	-0.136** (0.036)	-0.133** (0.039)
Political Stability			0.299 (0.938)	0.225 (0.883)	0.257 (0.888)	0.061 (0.916)
Control of corruption				0.375	0.803	0.462

				(1.265)	(1.161)	(1.001)
Trade openness					0.025	0.196
					(0.024)	(0.025)
Education						-0.624
						(0.664)
Constant	-13.370	-8.327	-7.918	-7.641	-8.542	-1.649
	(7.255)	(7.282)	(6.976)	(7.324)	(8.039)	(12.210)
Overall R-squared	0.6162	0.6493	0.6496	0.6498	0.6515	0.4974
Observations	229	229	229	229	229	229

Note: Standard errors are in parenthesis. Statistical significance levels: * $p < 0.05$. ** $p < 0.01$ *** $p < 0.001$.

In addition, the results for tests utilizing GDP for rich countries (instead of GDP growth) are shown in Table 9. In all models the main independent variable FDI is positively significant. Trade Openness and the constant are also significant in all models. However, the other variables do not show statistically significant results.

Table 9

Fixed Effects regressions of effect of FDI on GDP for Rich Latin American Countries from 2002 to 2022.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	1348.051**	1378.202**	1396.190**	1235.518**	1302.376**	1219.458***
	(336.317)	(341.433)	(308.379)	(174.663)	(236.463)	(199.861)
Inflation		20.841	20.196	7.805	25.680	23.634
		(15.615)	(16.500)	(13.419)	(20.357)	(21.646)
Political Stability			-247.042	-1002.440	-1095.560	-907.012
			(1236.900)	(949.838)	(726.785)	(765.875)
Control of corruption				3833.818	2563.997	2891.098
				(1806.616)	(1962.560)	(1881.887)
Trade openness					-75.347*	-69.773**
					(21.703)	(22.492)
Education						600.158
						(495.82)
Constant	23486.500**	24300.460**	-24638.490**	-21805.880**	-19128.510**	25760.910**
	(7146.498)	(7266.876)	(6588.753)	(3538.440)	(5185.513)	(7155.840)
Overall R-squared	0.153	0.148	0.113	0.541	0.207	0.333
Observations	229	229	229	229	229	229

Note: Standard errors are in parenthesis. Statistical significance levels: * $p < 0.05$. ** $p < 0.01$ *** $p < 0.001$.

4.4 Results excluding Haiti, Nicaragua, and Honduras.

Since the results for all the sample for on the regression with GDP growth generates significant results, but when divided into two groups results are not significant anymore, new tests are

conducted. Now, the tests exclude the three poorest countries of the initial sample based on average GNI over the years: Haiti, Nicaragua, and Honduras. This will be done due to the insignificance of results when sample is divided, while the overall results for all countries showed some significance. The purpose of this is to determine whether if excluding these countries yields more significant and insightful results. The results of this analysis are presented below in Table 10.

Table 10

Fixed Effects regressions of effect of FDI on GDP growth for 16 Latin American Countries from 2002 to 2022.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ln FDI	0.646** (0.194)	0.561** (0.175)	0.565** (0.171)	498.981** (0.171)	0.547*** (0.177)	0.605*** (0.151)
Inflation		-0.124*** (0.021)	-0.125*** (0.021)	-0.127*** (0.023)	-0.135** (0.027)	-0.129** (0.032)
Political stability			-0.101 (0.700)	-0.227 (0.697)	-0.172 (0.693)	-0.365 (0.884)
Control of corruption				0.830 (1.042)	1.203 (1.014)	0.867 (0.884)
Trade Openness					0.033 (0.023)	-0.025** (0.023)
Education						-0.832* (0.386)
Constant	-12.103* (4.745)	-9.356* (4.398)	-9.440** (4.266)	-8.863 (4.356)	-10.718* (4.553)	-0.827 (7.205)
Overall R-squared	0.491	0.528	0.208	0.486	0.440	0.464
Observations	327	327	327	327	327	327

*Note: Standard errors are in parenthesis. Statistical significance levels: *p < 0.05. **p < 0.01 ***p < 0.001.*

In the regression results above, it is shown that FDI has a positive significant impact in GDP growth, independently of the control variables added. The significance of FDI increases when the Trade openness and Education variables are added. The variable inflation is, just as for the previous results, negatively significant in all models. Political stability and control of corruption show non-significant coefficients. In Model six, the last two control variables are negatively significant.

Taking into consideration Model 6, which shows high significance for the main independent variable, but also for three out of the five control variables, three fixed effects regressions

utilizing interaction terms are done. The variables utilized for the interaction are Trade openness and Expected years of education. Results are displayed in Table 11. In Model 1, the coefficient for Ln FDI indicates a positive but statistically insignificant relationship with GDP growth. Inflation, with a significant negative coefficient impact on GDP growth, as well as Education. The interaction term of FDI and Trade openness is positive but not significant. Model 2 shows a similar pattern, with Ln FDI remaining insignificant and inflation maintaining its negative impact. The interaction term between Ln FDI and education is positive and not significant. In Model 3, Ln FDI shows a significant positive relationship with GDP growth. Inflation and education have significant negative coefficients. The other variables are insignificant. The interaction term between Trade openness and education is positive but not significant.

Table 11

Fixed Effects regressions of effect of FDI on GDP growth for 16 Latin American Countries from 2002 to 2022, with interaction effect.

	Model 1	Model 2	Model 3
Ln FDI	0.541 (0.519)	0.243 (1.138)	0.622** (0.156)
Inflation	-0.128 ** (0.031)	-0.130** (0.030)	-0.100** (0.037)
Political stability	-0.354 (0.6403)	-0.341 (0.672)	-0.203 (0.621)
Control of corruption	0.867 (0.881)	0.903 (0.898)	0.617 (0.761)
Trade Openness	0.007 (0.127)	0.023 (0.026)	-0.196 (0.117)
Education	-0.833** (0.387)	-1.394 (1.794)	-1.815** (0.738)
Ln FDI * Trade Openness	0.001 (0.006)		
Ln FDI * Education		0.025 (0.083)	
Trade Openness * Education			0.016 (0.009)
Constant	0.566 (13.728)	7.240 (25.141)	11.950 (11.030)
Overall R-squared	0.464	0.463	0.442
Observations	327	327	327

*Note: Standard errors are in parenthesis. Statistical significance levels: * $p < 0.05$. ** $p < 0.01$ *** $p < 0.001$.*

4.5 Robustness Check

To check the validity of the tests, a variance inflation factor (VIF) test is done to check for multicollinearity. As shown in table 12, the mean VIF is low (1.84), showing that multicollinearity is not an issue with the variables present in the models.

Table 12

VIF test results for multicollinearity.

Variable	VIF
Ln FDI	1.66
Inflation	1.28
Political Stability	2.46
Control of Corruption	2.38
Trade Openness	1.74
Education	1.75
Mean VIF	1.84

In addition, The Breusch-Pagan/Cook-Weisberg (1979) test is conducted to assess whether the regression models for GDP growth and GDP exhibit constant variance (homoscedasticity). The results are summarized in Table 13.

Table 13

Robustness check with Breusch-Pagan/Cook-Weisberg test.

Variable	Chi2(1)	Prob > chi2
Fitted values of GDP growth	0.31	0.5774
Fitted values of GDP	8.26	0.0040

The test statistic for GDP growth indicates that there is no evidence to reject the null hypothesis of constant variance, with a p-value of 0.5774. Therefore, there is support the assumption of homoscedasticity. However, for the variable GDP, the p-value is lower than 0.05, indicating that the null hypothesis of constant variance is rejected. Therefore, there is evidence of heteroskedasticity in the model, meaning that the variance of the errors is not constant and may depend on the values of the independent variables. In summary, while the GDP growth model appears to be robust, the GDP model does not.

4.6 Interpretation of Results

This section interprets and compares the findings from the fixed-effects regressions to understand the impact of Foreign Direct Investment on economic growth within Latin American countries. As discussed in the theoretical framework, based on previous literature, control variables such as inflation, control of corruption, education, trade openness, and political stability help isolate the effect of FDI on economic growth by accounting for factors that might influence economic growth.

The results consistently shows that the logarithm of FDI has a positive impact on the Latin American economies. This indicates that increases in FDI positively influenced the economic scenario of these countries during the years of 2002-2022, meaning that FDI was very beneficial for those countries' economy in the selected period. These findings align with previous studies, such as those by Alfaro et al. (2004) and Borensztein et al. (1998), which also highlight the beneficial effects of FDI on economic growth.

The significance of Ln FDI is evident across various models and different groupings. Firstly, Table 4 shows significant results across all models, supporting the positive relationship between FDI and economic growth for the 19 countries 2002 to 2022. Similarly, Table 9, which shows results utilizing GDP as dependent variable for the wealthier countries, also demonstrates significant results for FDI on GDP in all models. In line with this, Table 10, which excludes the three poorest countries, also show significant results for the relationship across all models. These results support the positive relationship between FDI and economic growth.

However, as shown in Tables 7 and 8, when analyzing solely the poor countries, no regression shows significant effects of FDI on economic performance, regardless of the dependent variable utilized. This indicates that possibly the effects of FDI on growth of less developed economies are not clearly defined and noticeable.

Further, Table 11 indicates that the influence of FDI on GDP growth is significantly augmented when education and trade openness are considered. Specifically, the interaction terms reveal that the positive effects of FDI are stronger in contexts with higher levels of educational and greater openness to trade. This suggests that countries which are both more open to trade and have higher expected years of schooling were able to better make use of the FDI inflows for economic growth, in the period of 2002-2022.

When examining the overall R-squared values of the models, those with higher values are more effective because they explain a larger portion of the variability in GDP growth. Tables 4, 6, and 8, which present fixed-effects regressions for all, poor, and rich Latin American countries

respectively, all show overall R-squared values greater than 0.5. This indicates that these models account for more than half of the variation in GDP growth, which suggests a strong explanatory power of the models. However, it is important to notice that while a high R-squared suggests a good fit, it does not imply causation and does not reflect the predictive power of the model in if these were to be done in other samples.

Lastly, the robustness checks displayed on Tables 12 and 13 assess heteroskedasticity and multicollinearity. The test for GDP growth indicates that the variance of the residuals is constant. However, the test for GDP reveals evidence of heteroskedasticity, therefore the variance of the residuals depends on the values of the independent variables. This indicates potential reliability issues with the GDP model's coefficients, emphasizing the need for further robustness checks. Nonetheless, there is no sign of multicollinearity between the variables, ensuring that the relationships between the independent and dependent variables are properly represented, allowing for clearer and precise interpretations of the results.

Overall, the comprehensive analysis consistently demonstrates that FDI has a positive impact on economic growth in Latin American countries. This relationship holds true also when after accounting for control variables and robustness checks.

4.7 Research Limitations

While this study provides insights into the impact of FDI on economic growth in Latin America, it has limitations. Firstly, there is a concern regarding endogeneity and omitted variable bias. This could result from not including all relevant variables in the model, leading to potentially inaccurate coefficient estimates due to this bias. In addition, there is also a risk that there is reverse causality, meaning that both FDI improves economic growth, but a country with higher economic growth attracts more FDI inflows; this ambiguity could also be leading to biased results. To address the endogeneity issue, future research could make use of Instrumental Variables, or lagged variables.

Moreover, this study does not capture all Latin American countries due to the lack of necessary data from some countries over the years. Ideally, including all countries would allow for a better understanding of the effects and relationships; however, this paper analyzes only 19 countries, which could bias the results and lower the generalizability and applicability of the findings.

In addition to the limitations, the paper attempts to find the best way to assess the impact of FDI on economic growth by running regressions on both GDP and GDP growth. However, the results are inconsistent, and the research is unable to conclusively determine which of the two measures is more appropriate, as the significance varies depending on the sample used.

To build on the findings of this paper, future research could benefit from doing a similar analysis but also utilizing differentiation of FDI types and looking into the effects of each type on economic growth of a country. Additionally, future research would benefit from including different control variables which can help capture a wider range of factors influencing economic growth in Latin America. Further, for a more extensive analysis, it would be interesting to consider all different levels of income, and not only divided the countries into two categories, but rather in also low-income, lower-middle-income, upper-middle-income, and high-income groups. An alternative for this would be considering the developing stage of countries, since depending on this different stage, the effects might differ.

5. Conclusion

This paper investigated the impact of Foreign Direct Investment (FDI) on economic growth in Latin American countries from 2002 to 2022, utilizing a fixed-effects regression model to control for time-invariant aspects. It also included control variables such as inflation, corruption control, education, trade openness, and political stability, which are factors that can vary over time and influence both the dependent variable (economic growth) and the independent variable (FDI) and therefore need to be controlled for.

The central research question aimed to understand the impact of FDI on the economic growth of Latin American countries from 2002 to 2022. To help answer the question, it was hypothesized that: 1- FDI had a positive effect on GDP (growth) over the 21 years; and 2- This impact is moderated by factors (inflation, control of corruption, education, trade openness, and political stability), which are accounted in the paper as control variables.

The results consistently demonstrate that FDI had a positive impact on the economic growth of these countries in the given years. It is also found that the positive impact of FDI on GDP growth is significantly increased when higher education and trade openness are accounted for. This means that countries which are more open to trade and have a higher expected level of education tend to attract more FDI, influencing positively the economic growth of the host country. This shows the important roles of human capital development and trade policies in maximizing the benefits of FDI.

The findings support the hypotheses, showing that FDI had a positive effect on economic growth and that its effectiveness is enhanced when controlling for variables. Therefore, the hypotheses are accepted. The findings of this research are aligned with previous literature, which highlights the beneficial effects of FDI on the economic growth of countries. For

example, the neoclassical theory, proposed by Solow (1956), suggests that FDI contributes to economic growth by supplementing domestic capital, and therefore increasing the capital supply and boosting productivity.

Additionally, the study also finds differences in the impact of FDI between different groups of countries. While wealthier countries showed significant positive effects of FDI, poorer countries did not show the same benefits, in terms of the significance of results. This could be an indicator of the differences in the absorptive capacity of a country and its impact on economic growth and development, depending on country-specific conditions.

The paper also has limitations, such as potential omitted variable bias, endogeneity issues, and the exclusion of some Latin American countries due to data constraints. These may have affected the robustness and generalizability of the findings. Future research should address these issues by exploring different control variables to ensure all factors influencing economic growth are considered. Additionally, analyses should be done based on different criteria beyond the rich/poor classification. It would be also interesting to employ different econometric techniques and broaden the dataset to overcome biases in the results.

In conclusion, FDI generally promoted economic growth in Latin America from 2002 to 2022. However, its exact effectiveness and impact are difficult to capture, since it is dependent on numerous factors, such as the regression model and grouping used in the analysis. This study shows the importance of governance factors and the human capital context of a country on the effect of FDI on economic growth and shows that when these aspects play a role, FDI is a significant positive aspect of the economy of a country. Lastly, this research provides more evidence for the ongoing dialogue and investigation into the dynamics between FDI and economic growth in the Latin American region.

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