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The impact of foreign direct investment on economic growth for countries in Latin America

An empirical study using Schumpeterian club convergence to study endogenous relationships

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Abstract

This paper examines how Foreign Direct Investment (FDI) affects Economic Growth and Total Factor Productivity (TFP) for recipient countries in Latin America. The study investigates whether FDI generates positive spillover effects, leading to a higher increase in TFP than domestic investments. According to the Schumpeterian model increasing in TFP would lead to a higher economic growth rate (Lucas, 1988; Romer, 1990). Furthermore, the interaction effect between FDI and human capital considers seeing if there is a threshold of human capital that the economy requires in order to absorb the positive external effects FDI might generate. The econometric model relies on a panel study including data from 21 countries in Latin America from 1995-2019, and the main variables originate from The World Bank Data. FDI is expected to affect TFP by elevating education levels positively, but the results on economic growth are ambiguous, with most results not significant. The initial effect of FDI and human capital on TFP is negative, but after accounting for the interaction effect, the percentage of the population graduating from secondary school will have a less negative or positive effect. The interaction effect between FDI and human capital, which is higher than domestic investments, can also demonstrate a positive spillover effect from FDI to recipient countries. Considering endogeneity, autocorrelation, heteroscedasticity, and multicollinearity, the empirical results are robust.

Keywords: FDI, TFP, Economic Growth, Human Capital, Latin America, Schumpeterian model

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LIST OF ABBREVIATIONS AND ACRONYMS

FDI	Foreign Direct Investment
GDP	Gross Domestic Product
MEO	Multinational Enterprises Operating
TFP	Total Factor Productivity
MNE	Multinational Enterprise
R&D	Research and Development
GDPCF	Gross Domestic Product Capital Formation
GNE	Gross National Expenditure
WGI	Worldwide Governance Indicator
GDPPC	Gross Domestic Product Per Capita

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1. Introduction

This study examines how FDI influences economic growth and TFP in 21 Latin American countries and how initial human capital interacts with FDI to absorb technological spillovers. Achieving economic growth might be one of the main targets for policymakers in a country. Although this is the case, economic growth differs across countries, resulting in enormous differences in Gross Domestic Product (GDP) per capita. Numerous studies have examined the factors that contribute to economic growth. Although empirical results have been elusive, Aghion & Howitt (2009) pointed out technological differences as a critical factor. Over the 1990s, Latin America saw increased Foreign Direct Investment (FDI) inflows due to structural changes, reforms, and open markets with less governmental control of FDI (Alvarado, I.iguez & Ponce, 2017). The value of exporting goods from Latin America, such as copper, oil, and lithium, has increased over the last decades and has provided investors with an incentive to invest in the region (ECLAC, 2021).

As Aghion & Howitt (2009) pointed out, technological differences are essential for economic growth. The importance of technology for economic growth provides an essential link between the inflow of FDI and the host countries' economic growth since capital is quite mobile in today's world. During the last decades, FDI has increased, and according to some research, it has had a more significant impact on economic growth than domestic investments due to spillover effects in forms of improved technology whereby domestic firms adopt Multinational Enterprises Operating (MEO) technology and enhance the long-run growth rate in the host country (OECD, 2002).

However, it is crucial for the host country to have adequate human capital to adopt a technical transfer (Lucas, 1988; Romer, 1990). The purpose of this study is to determine how FDI contributes to economic growth and TFP in recipient countries in Latin America. In order to understand the relationship and difference between TFP and economic growth, it is vital to acknowledge the relationship between them. In a country with high economic growth, its TFP will likely be high as well. A measure of TFP is the level of GDP, while a measure of economic growth is the rate at which GDP increases each year. A change in TFP becomes more of a snapshot, while a change in GDP becomes more of a measure of economic growth.

Furthermore, this study examines whether the initial human capital interacts with FDI to affect economic growth and TFP concerning the ability to absorb technological spillovers.

The results from previous papers have been criticized because of the chosen time periods and the countries included in the research. For example, countries in Latin America differ from their African counterparts in others in terms of economic structure, their general level of development, and political and cultural situation (Alfaro, Sebnem & Vadym, 2005.).

Contrary to previous studies, this paper examines the role of FDI in the process of technological innovation in 21 Latin American countries (Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela), spanning from 1995 to 2019. However, a few other Latin American countries were excluded due to incomplete data throughout the chosen time period. The empirical work is motivated by a model of endogenous growth, where technological progress is the primary determinant of a country's long-term economic growth rate. Data are produced in the form of panel data (time series and cross-sectional observations) and are divided into five different time periods with a length of five years for each period[1]. We have chosen to constrain the study and are therefore only researching the effects of FDI in the host country via the transfer of knowledge and other spillover effects. An outflow of knowledge from the source country is not expected.

1.2 Structural Overview

Chapter 2 will conceptualize and introduce FDI and describe different types of FDI, followed by what factors affect FDI. Furthermore, it will describe the FDI inflow to Latin America from the 1990s. Chapter 3 contains a description of the theoretical baseline with the Schumpeterian model, the Schumpeterian model with club convergence, and the connection between the Schumpeterian model and FDI. Technological spillover effects and the vital role of adequate human capital for the recipient country are discussed in Chapter 4, followed by a presentation of empirical research on FDI, and economic growth. Chapter 5 describes the empirical methodology, data sources, and variables used. In chapter 6, the results from the

[1] When TFP is the dependent variable in the regressions data is divided into four different periods with a length of five year for each period.

panel study (OLS regressions) are presented and analyzed. Lastly, conclusions are explained and discussed in Chapter 7.

2. FDI and Economic Growth

2.1.1 Definition of FDI

FDI is the process whereby residents of one country (the home country) acquire ownership of assets to control a firm's production, distribution, and other activities in another country (the recipient country). It can be seen as a long-term relationship compared to portfolio investments, which are more short-term and involve a high turnover of securities. Worldbank (2022a) defines FDI as "*an investment that is made to acquire a lasting interest in an enterprise operating in an economy other than of the investor, the investor's purpose being to have an effective voice in the management of the enterprises*." Generally, there is no agreement on what constitutes a controlling interest, but 10% shareholding is the minimum threshold (Worldbank, 2022a).

FDI has three components: equity capital, intra-company loans, and reinvested earnings. Equity capital, the most significant element of FDI financing, is the foreign direct investor's purchase of shares of an enterprise in a country other than its own without using leverage. Intra-company loans refer to short- or long-term borrowing and lending funds between direct investors and affiliate enterprises. Reinvested earnings correspond to the foreign affiliates' earnings not distributed as dividends to the parent company. Such retained profits by affiliates are reinvested (Unctad, 2007).

2.1.2 Types of FDI

There are two types of FDI entries. The first one is greenfield investments which refer to investment in new facilities and establishing new entities through entry and expansion. The second one is mergers & acquisitions, which relates to acquisitions of, or mergers with, existing local firms (International Monetary fund, 2014).

A direct investor can be classified into different sectors of the economy and can be one of the following: private person, group of individuals, a public or private company, company group, government body, state power or administration, or a combination of the above (OECD, 2008). Unlike domestic firms, multinational enterprises (MNEs) face higher costs since they have less domestic knowledge, pay their workers higher wages, and have higher factor productivity. MNEs are also more intensive in capital, skilled labor, and intellectual property. They are also more profitable and more likely to export. (Blomström & Sjöholm, 1999). Regardless of the type of FDI, the central question for the host country's interest is the extent to which FDI contributes to long-term economic growth through direct effects (increased investments and trade) and indirect ones (technological spillovers to local firms) (OECD, 2002).

2.1.3 What factors affect FDI?

What country characteristics are then crucial in determining FDI? GDP is typically the most important determinant of FDI flows. It is common to hypothesize that a firm will have a strong incentive to invest in a country with high local demand. On the supply side, a more extensive market should diminish firms' costs due to economies of scale. Another critical factor that may affect incentives for FDI is labor costs and public governance. Maria-Angels & Rivera-Batiz (2002) argue that democratic countries should attract FDI since democracy tends to reduce political and economic uncertainty. Multinational companies are increasingly likely to avoid investing in a repressive regime to avoid damaging their brand name and image. La Porta, Lopez-de-Silanes, Shleifer & Vishny (1999) points out that the government plays a significant role in delivering health, education, and infrastructure, mainly when the consumption of these goods cannot be confined to specific individuals and generates substantial positive externalities. There is plenty of research (Wheeler & Mody, 1992; Noorbakhsh, Paloni & Ali, 2001; Asiedu, 2006) that verifies that the availability of physical infrastructure and the level of human capital are essential determinants of FDI. The level of education also determines the ability to absorb spillover effects in the country (Borensztein, De Gregorio & Lee, 1998).

2.1.4 FDI flow to Latin America from 1995-2019

During the 1990s, the inflow of FDI to Latin America increased due to structural reforms, open markets with less control of the FDI from the government, and more privatizations. The main economic activity for the countries in Latin America has been via the extraction of natural resources (Alvarado et al., 2017). Increased prices on export goods, for example, copper, oil, and lithium from Latin America, have elevated the incentive for foreign investors to invest in the region for the last decades (ECLAC, 2021). The rate of FDI has increased from just over two percent of GDP in 1995 to more than ten percent of GDP in 2020, see Figure 1. Meanwhile, Latin American countries' average GDP growth rate increased by approximately one percent between 1995 and 2019 (Worldbank, 2022b). Although the growth rate has not increased significantly between 1995 and 2019, there are variations between the growth rates from 1995 to 2019. These variations should allow significant results to be obtained between FDI and economic growth. There has not been an even rise in the inflow of FDI, which can be linked to an acceleration in the commodity cycle with subsequent large-scale investments in the mining and hydrocarbon sector. At the beginning of the 21st century, the interest in FDI shifted from the previous mining and oil industries to investment in renewable energy and telecommunication (ECLAC, 2018). For more detailed information about the inflow of FDI to Latin America for each country, see Table A and B.1-B.5 in the Appendix.

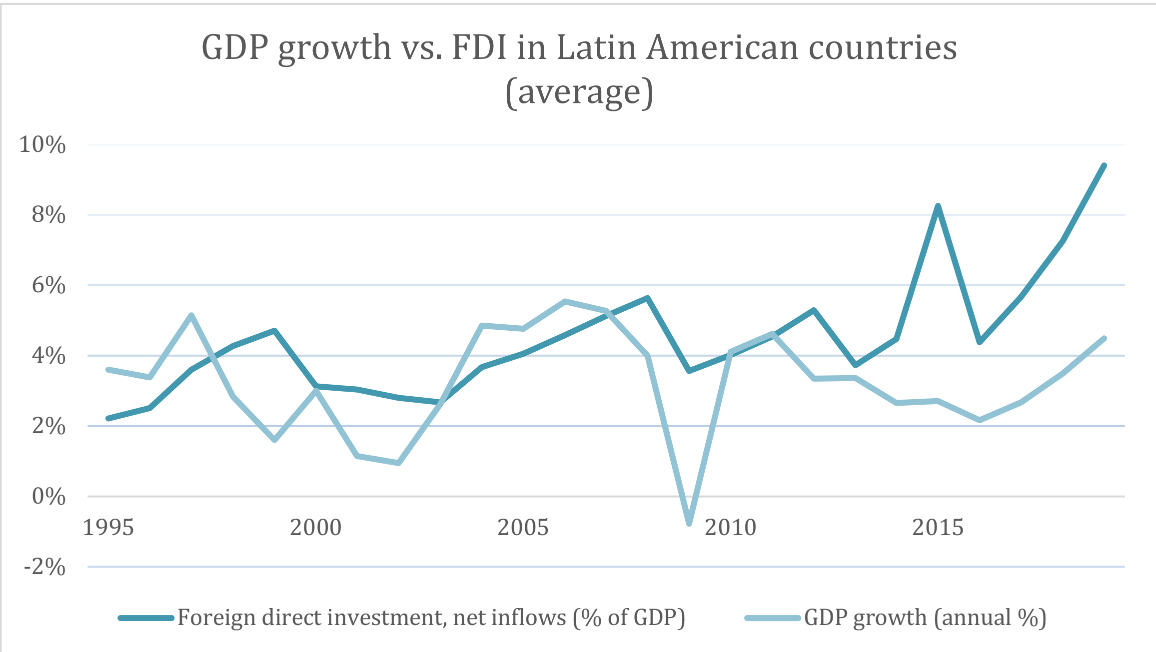

Figure 1: Average FDI of GDP and GDP growth for Latin America, 1995-2019
Source: Worldbank, 2022b.

3. The theoretical framework of economic growth

The purpose of this chapter is to introduce and explain the theoretical framework that supports the empirical analysis. Economic growth is expected to be affected by technological improvements, as discussed in earlier chapters. To illustrate this, an overview of the Schumpeterian endogenous growth model is explained. Moreover, the Schumpeterian model with club convergence is presented to clarify the advantage of backwardness and the beneficial effects of technological spillovers on economic growth.

3.1 The Schumpeterian model

The neoclassical and exogenous Solow-Swan growth model (Solow, 1956; Swan, 1956), introduced independently of Solow and Swan, is the most common growth models to base empirical research on in this field. Its baseline framework is a quantitative tool that estimates the factors of capital accumulation (labor market and capital) and productivity (technology). Economic growth depends on the initial level of production and the exogenously given technological progress, capital depreciation, and population growth rates.

Hence, to explain the achievements of long-run economic growth due to changes in the rate of technology, an endogenous growth model was presented by Aghion and Howitt, called The Schumpeterian model (The model is named after Joseph A. Schumpeter). This endogenous growth model is divided into three sectors (intermediate goods, final goods, and research). Improvements in technologies are quality-improving innovations and the productivity parameter A_t is the key. The advancement of new technologies renders the old obsolete and leads to creative destruction. A_t measures the economy's ability to transform inputs into output. The economy's growth rate g_t is the proportional growth rate of the productivity parameter A_t shown in Equation (1).

$$g_t = \frac{A_t - A_{t-1}}{A_{t-1}} \qquad (1)$$

In an economy where research is carried out, the aggregated productivity growth rate is not random since lousy luck in some sectors will be compensated by better luck in other sectors. The fraction of sectors that innovates each period are μ, and sectors that do not innovate are $(1 - \mu)$. The parameter γ reflects the productivity in the research sector; hence, the level of productivity for the current time period depends on the number of sectors that do innovate, times the improvement of productivity which the innovation gives rise to from the previous time period. The share of sectors that do not innovate contributes to the same productivity as during the last period. This is shown in Equation (2).

$$A_t = \mu\gamma A_{t-1} + (1 - \mu)A_{t-1} \tag{2}$$

It is derived that A_t can be expressed using Equation (2). Adding this to Equation (1) yields Equation (3).

$$g_t = \frac{\mu\gamma A_{t-1} + (1-\mu)A_{t-1} - A_{t-1}}{A_{t-1}} \tag{3}$$

Both the denominator and the numerator of Equation (3) contain the productivity parameter from the previous period A_{t-1}, which cancels each other in the first two steps and in the third: only one parameter remains. By reducing the expression, the Schumpeterian model ensures that the economic growth rate in a multisector economy equals the constant in Equation (4).

$$g = \mu \cdot (\gamma - 1) \tag{4}$$

Hence the long-run growth rate in an economy depends on the probability of innovation μ and the fraction of productivity γ in the research sector. According to the Schumpeterian model, an increase in the productivity parameter from Research and Development (R&D) investments is essential for an economy to reach a higher economic growth rate. In other words, for FDI to have a more significant impact on TFP and economic growth, the spillover effect from FDI needs to have a higher impact on the productivity parameter or increase the probability of sectors that innovate. This can be done either through knowledge transfer from MNEs or a higher incentive of R&D for the host country (Aghion & Howitt, 2009).

3.2 The Schumpeterian model introducing club convergence

Since the mid-20th, the more developed economies of the world seem to build a club of convergence where the poorer countries have been excluded from the club and seem to have fallen further and further behind. To describe this phenomenon, when one group of countries converges to parallel economic growth rates while other countries are excluded and face nearly stagnated economic growth rates, club convergence is added to the Schumpeterian model. Economies belonging to the convergence club and innovating at a favorable rate will grow at the same rate meanwhile countries outside the club cannot absorb technology transfer due to poor education systems, institutions, and credit markets and hence stagnate. A favorable rate is when the profit of innovating is higher than the cost, including achieving a sufficient level of human capital. Taking technological transfer into account, the long-run growth rate for a country that remains in the convergence club might not depend on the technological growth rate of the own country presented in Equation (1). Instead, the economic growth rate depends on the economic growth rate of the world's productivity frontier. In the long run, the gap between the following country and the world technological leader is expected to diminish, called the advantage of backwardness. Since an increase in the global frontier will positively impact the economy following, thanks to the productivity distribution. Hence the distance to the technological frontier will diminish when an economy has the ability to absorb technology transfer from abroad.

In contrast, economies with poor macroeconomic conditions and a low human capital will not innovate in equilibrium, thereby not benefitting from the technological transfer. These countries will not benefit from the advantage of backwardness and instead stagnate (Aghion & Howitt, 2009). This model is essential to explain why technological transfer from FDI could play an important role in the economic growth of the host country and why some countries might face a more significant impact than others due to the human capital threshold. Club convergence might also explain why countries with a lower initial level of GDP tend to have a greater economic growth rate than countries with a higher initial level of GDP. Martin & Vazquez, (2015) claim that Latin American countries face club convergence in their study of 18 Latin American countries over the period 1950- 2008 and support the utility of distinguishing the impact of FDI on both TFP and economic growth.

3.3 The Schumpeterian model and FDI

An essential factor in the growth theory is technological development. It is essential in both exogenous growth literature (Solow, 1956; Swan, 1956) and endogenous growth literature (Lucas, 1988; Romer, 1990). However, the two theoretical approaches have important and somewhat different implications for empirical research. In the neoclassical growth literature, foreign capital is often considered an essential complement to capital and investment shortages, making it possible to adjust the short-term effects of FDI on economic growth through its mere contribution to capital formation (Aghion & Howitt, 2009).

According to endogenous growth theory and the Schumpeterian model, the relationship between FDI and domestic investments is more complex and dependent on a host country with characteristics that depict differences in technological development, accumulated knowledge stock, and human capital. If the latter factors affect the positive interaction between domestic and foreign capital flows, that is, if FDI stimulates domestic savings, it is expected to have a permanent positive impact on economic growth. The endogenous growth literature contains another view of technology, which is probably dependent on country-specific technical and learning efforts, which means that technology cannot be used efficiently or immediately. Hence, whether FDI can be considered long-term economic growth-promoting through the dissemination of knowledge depends mainly on the "absorbency" of local companies and industries and the degree of technology-related complementarity between foreign and local companies. According to the Schumpeterian model, the recipient country will converge to a new steady state with no economic growth (Borensztein et al., 1998; Shell, 1966).

4. FDI and Economic Growth

In light of the Schumpeterian model, this chapter focuses on whether and how FDI can benefit the recipient country compared to domestic investments. Thus, this chapter deals with how FDI can generate technological spillovers for the recipient country and what role human capital plays in absorbing technology. Additionally, FDI and economic growth are portrayed and discussed in light of previous studies.

4.1 Spillover effects and the interaction effect between human capital and FDI

The literature suggests that FDI transfers technology to the host economy, either directly or indirectly, via four mechanisms: horizontal effects, vertical linkages, labor turnover, and international technology spillovers. Horizontal effects are the diffusion of technology through either imitation or competition effects. Imitation means local firms improve their productivity by copying some technology used by MNEs affiliates in the local market.

Vertical linkages are another channel for spillovers through the backward and forward linkages between the MNEs and their local suppliers and customers. A vertical linkage facilitates the transfer of learning, information, technical, financial, and business services between firms. Labor turnover is through which technology may be transferred and disseminated in a host country. When affiliates demonstrate new techniques to and train local workers, who later accept employment in local firms or start their firms, their workers may transfer knowledge. Technology spillovers may appear from FDI contributing directly to developing countries' knowledge generation through the internationalization of MNE's R&D activities. MNEs concentrate their R&D activities in their home countries or other developed countries. Developing countries account for only 6 percent of global R&D expenditure (OECD, 2002). These positive external effects of FDI, when there is a high enough level of human capital, emphasize the interest in examining the interaction effect between FDI and the level of human capital. Blomström, Kokko & Zejan (1994) concluded that the impact of FDI on economic growth depends on the interaction with the country's absorptive capability.

The domestic absorptive capacity from spillover effects of FDI depends on the level of human capital, the development of domestic financial markets, and trade policies. Therefore, the stock of human capital in the host country limits the absorptive capability of a developing country. In other words, in a country with a deficient level of human capital, the absorptive capacity is limited and leads to a negative effect of FDI on economic growth since the FDI might crowd out domestic investments, and there is no transfer of knowledge and improvements in the technology (Hsieh, Hurst, Jones & Klenow, 2019). Nevertheless, if a country instead has a sufficient level of human capital, FDI would be beneficial (Romer, 1990).

4.2 Empirical review

Previous empirical research investigating the impact of FDI on economic growth generally reveals ambiguity. While substantial evidence suggests that FDI positively affects economic growth (Moudatsou, 2003; Silajdzic & Mehic, 2015), several studies concluded significant adverse effects of FDI on economic growth (Carkovic & Levine, 2005; Saltz, 1992). Furthermore, a few studies found neither positive nor negative impacts. Boyd & Smith (1992) predicted that FDI in the presence of preexisting trade, price, financial, and other distortions would hurt resource allocation and, thereby, economic growth. Carkovic & Levine (2005) studied developed and developing countries and constructed a panel dataset from 1960 to 1995. The results showed no significant effect on FDI inflows and only irregular outcomes during five-year periods. The same authors found that research on the impact of FDI on economic growth was inconclusive. Silajdzic & Mehic (2015) studied economies in Central and Eastern Europe from 2000 to 2013 and found that FDI affected economic growth significantly and positively. As Moudatsou (2003) shows, FDI has a positive effect on economic growth in European countries between 1980 and 1996. Research results can be affected by many factors, including the region and time period covered in previous studies.

To investigate whether FDI positively affects TFP in host countries, De Mello (1999) used panel data from 16 OECD countries and 17 non-OECD countries. FDI positively impacted TFP in both groups. In OECD countries, FDI tended to increase TFP through higher productivity, thus promoting technological change. In non-OECD countries, capital accumulation increased output growth. Potential reasons for the results in the non-OECD countries may be less efficient in using the new technology embodied in FDI-related capital accumulation. They can depend on the difficulties of assimilating capital and technology improvements.

Borensztein et al. (1998) considered the effect of FDI on economic growth in a cross-country regression framework using data on FDI flows from industrial countries to 69 developing countries in two different decades (1970-1979 and 1980-1989). The authors highlighted the importance of technology diffusion. They explained the economic growth rate in developing countries as more like a "catch-up" process to the world's leading technology (in line with endogenous growth theory). Borensztein et al. concluded that FDI did have an overall positive effect on economic growth. However, this effect's magnitude depends on the stock of human capital in the host country, as discussed previously (Romer, 1990; Blomström et al., 1994; Hsieh et al., 2019).

Alfaro et al. (2005) emphasized the difficulty of reaching a consensus in the research field between the factors that lead to the inflow of foreign direct investment and whether there is a clear positive relationship between FDI and economic growth. Furthermore, Alfaro et al. claimed that the mixed results were due to the different research's chosen time periods and countries. For example, countries in Latin America differ from their African counterparts in terms of economic structure, their general level of development, and political and cultural situation. Contrary to previous studies, this paper examines the role of FDI in the process of technological innovation in 21 Latin American countries, spanning from 1995 to 2019.

5. Empirical methodology

There are three sections in this chapter. First, we describe the methodological framework based on the Schumpeterian growth model, considering technological advancement and human capital growth to be endogenous (Romer, 1990). The data sources and variables follow this. Finally, issues with endogeneity, serial correlation, multicollinearity, and heteroskedasticity are examined.

5.1 Econometric modeling

This paper examines how FDI contributes to economic growth and TFP in recipient countries and what role the level of education plays in the ability to absorb technology spillover effects. In addition, this study examines whether the initial human capital interacts with FDI to affect economic growth and TFP.

The econometric model is based on a panel study (time-series and cross-sectional data), including data from 21 countries in Latin America spanning from 1995-2019. Using a dynamic econometric specification as a panel study controls for business cycle fluctuations and hysteresis effects, as well as income convergence to long-run steady-state levels. Fixed effects are applied to account for the national characteristics of the growth processes within the countries of Latin America (Verbeek, 2017) and are supported by The Hausman test (Enders, 2010). In a second step, interaction variables are introduced within the model to check if there are any human capital barriers to FDI or Domestic Investments to impact TFP and economic growth. The econometric model in equation 1 serves as the objective model for both regressions and can be used to estimate the effect of FDI on GDP growth and TFP. The empirical approach can be expressed within this general framework.

$$y = \alpha + \theta_k X_n{}' + \beta_n X_{n-1}{}' + \phi_k Z' R_t + \psi_{EP} + \varepsilon \qquad (1)$$

y serves as the dependent variable and is a Nx1 vector. α is a 1xN vector and serves as the intercept while $\theta_k = (\theta_1 \ldots\ldots, \theta_k)$ captures the effect of the explanatory variables while $\beta_k = (\beta_1, \beta_2)$ captures the impact of the lagged explanatory variables on TFP. $X_n = (X_1 \ldots . X_n)$ is a NxK matrix of all the explanatory variables. X_{n-1} is a NxK matrix as well but captures the explanatory variables that are lagged one period. $\phi_k = (\phi_1 \ldots\ldots, \phi_k)$ is a 1xK vector that captures the impact of the two interaction effects on TFP where Z serves as the schooling variable while R_t serves as the other variable in the interaction. t is either FDI or domestic investments. ε is representing an N-dimensional shock process to account for exogenous effects. $\psi_{EP} = (\psi_{11},\ldots, \psi_{EP})$ serves as a dummy over a sample of E countries and P periods.

According to the Schumpeterian model, and previous research, four hypotheses are constructed: (1) Foreign direct investment should positively contribute to TFP. (2) Foreign direct investment should positively contribute to economic growth. (3) FDI and schooling should interact positively for a sufficient level of schooling and negatively for a decent level of schooling for both TFP and economic growth. (4) As a result of spillover effects generated by FDI, the interaction effect between FDI and schooling is expected to be greater than the interaction effect between FDI and domestic investments.

5.2 Data and variables

The empirical model is estimated and tested in practice, and the framework is applied to 21 countries in Latin America using panel data (time series and cross-sectional data). The data is divided into five-year periods when estimating the impact of FDI on GDP growth spanning from 1995-2019[2]. All variables besides TFP and Schooling are collected from The World Bank Datasource ranging from 1990-2019. Data for TFP are gathered from UNCTAD (2000-2018), and data for Schooling is collected from Barro-Lee Dataset (1995-2015). The variable Schooling consists of five-year periods spanning from 1995-2015. One time period was inferred to get complete data until 2019 by taking the average from the two previous periods to extend for the period 2015-2019. As an example: Ecuador had 2005 to 2009 a value of 27.34, and from 2010 to 2014 a value of 35.52. By taking the average of these two time periods, data for the period 2015-2019 is computed to be 31.43. The same procedure is used for all countries in Latin America to get complete data.

The empirical analysis consists of two dependent variables: *GDP growth* and *Total Factor Productivity (TFP)*. In the regression with GDP growth as the dependent variable, FDI is lagged for one time period. In the regression with TFP as the dependent variable, FDI and

[2] Data for estimating the impact of FDI on TFP are spanning from 2000-2018.

GDP per capita are lagged one time period. GDP per capita is lagged one time period when regressing on GDP growth in comparison to TFP since contemporaneous effects might not affect GDP growth since it is more of a long-term measure. As discussed earlier, TFP is more of a snapshot, and contemporaneous effects should be more viewable for that measure. According to Bellemare, Masaki & Pepinsky (2017), it is proposed to use lagged explanatory variables to make the causal interpretation more specific.

In addition to FDI lagged one time period, various control variables are used as explanatory variables to determine if FDI is significant: Gross Domestic Product Per Capita (GDPPC) lagged one time period, Gross Domestic Product Capital Formation (GDPCF), Gross Domestic Expenditure (GNE), Inflation, Worldwide Governance Indicator (WGI) and Schooling.

As discussed, Romer, 1990; Blomström et al., 1994; Hsieh et al., 2019; Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2004, emphasized the essential human capital barriers, and therefore a measure of human capital plays a vital role in the empirical analysis. In this thesis, the human capital is measured by the percentage of the population who have completed secondary school. The worldwide Governance indicator (WGI) measures political stability in the country. Besides the political and social factors that affect a country's economic growth performance, other factors such as cultural and technological factors can also contribute to its development. Asiedu (2003) also noted that inflation could be a proxy for political instability. More detailed descriptions of the variables are found in Table 1.

In addition to the control variables, two interaction variables are constructed (FDI*Schooling, and GDPCF*schooling) to assess the interaction effect between the level of human capital for FDI on economic growth and TFP, motivated by previous research (Blomström et al.,1994; Borensztein et al., 1998). The second interaction variable (GDPCF*schooling) is created to determine if FDI and domestic investments differ in relevant ways. If FDI does indeed have a greater effect, this could suggest that FDI has some sort of spillover effect compared to domestic investments. In a regression, an interaction effect exists when the effect of an independent variable on a dependent variable change, depending on the value(s) of one or more independent variables. In this regression, we want to test if human capital and FDI affect economic growth and TFP.

Table 1. Description of the variables

Variable	Datasource	Description
GDP Growth	The World Bank (1995–2019)	Annual percentage growth rate of GDP at 2015 prices on constant local currency, expressed in U.S dollars. GDP is the sum of all gross value plus any product taxes and minus any subsidies not included in the value of the products. Depreciation, depletion, and degradation of natural resources have not been considered.
Total Factor Productivity (TFP)	UNCTAD (2000–2018)	Also referred to as the Productivity capacity index (PCI) and is the geometric average of the eight PCI categories: human capital, natural capital, energy, Information, and Communications Technology (ICT), transport, institutions, private sector, and structural change. Data is measured in percentile rank terms, ranging from 0 (lowest rank) to 100 (highest rank).
Foreign Direct Investment (FDI)	The World Bank (1990–2019)	Net inflows (percent of GDP). The measure captures the sum of equity capital, reinvestment of earnings, long-term capital, and short-term capital as shown in the balance of payments. The variable is lagged one period when used in the empirical analysis.
Gross Domestic Product Per Capita (GDPPC)	The World Bank (1990–2019)	Data are in current U.S. dollars and is calculated by taking the GDP divided by midyear population. When GDPPC is used in the empirical analysis for GDP growth (regression 2.2 - 2.6) the variable lagged one period.
Gross Domestic Product Capital Formation (GDPCF)	The World Bank (1995–2019)	Measured in percent of GDP (formerly gross domestic investment) and consists of fixed assets (land improvement, plant, machinery, equipment purchases, construction of roads, schools, offices, hospitals and so on) and inventories (stocks of goods held by firms).
Gross Domestic Expenditure (GNE)	The World Bank (1995–2019)	Measured in percent of GDP (Formerly domestic absorption) and it is the sum of households' final consumption expenditure, general government final consumption, and gross capital formation.
Inflation	The World Bank (1995–2019)	The annual growth rate of the GDP implicit deflator shows the change in the rate of price in the economy as a whole. Measured in local and constant currency.

Worldwide Governance Indicator (WGI)	The World Bank (1996–2019)	Includes seven key dimensions of governance: Voice and Accountability, Government Effectiveness, Rule of Law, Regulatory Quality, Control of Corruption, Political Stability, and Lack of Violence. The year 1995 is missing for all countries and has therefore been calculated by taking the average over the years 1996 to 1998. This is motivated by the stability of this measure from this period. The data is measured in percentile rank terms, ranging from 0 (lowest rank) to 100 (highest rank).
Schooling	Barro-Lee Dataset (1995–2015)	Percentage of population aged 15-64 that has completed secondary school computed in periods of five years. The period 2015-2019 is calculated by taking the average of the two latest periods (Period 2005-2010 and Period 2010-2015) This extension of data is made of concern to the fact that the variable schooling follow a steady path and that other human capital measures follows a stable path even for the period 2015-2019. The variable is used as a continuous variable since there are no significant levels obtained when plotting the data for the various countries.

5.3 Heteroskedasticity, Endogeneity & Multicollinearity issues

One of the main issues with panel data is heteroskedasticity, which shows that the variance of the residuals is not distributed equally across all levels of the independent variable. A Breusch-Pagan test was performed (also known as a Heteroskedasticity test) on the data to determine if there was a problem with heteroskedasticity. On a 1 percent level, the null hypothesis (data is homoskedastic) could be rejected, and the test concludes that the data has a problem with heteroskedasticity. To make a valid inference due to the problem with heteroskedasticity, the regressions are estimated using robust standard errors (Enders, 2010).

Alike heteroskedasticity, serial correlation also appears to be a critical problem associated with panel data analysis. A test was performed to see whether a serial correlation exists in the data using the Wooldridge test for autocorrelation in panel data. The results suggested no significant serial correlation (Verbeek, 2017).

Besides heteroskedasticity and autocorrelation, a well-known issue in economic growth theory is the concern of endogeneity between the country-specific economic growth and some of the explanatory variables. Like Haaf & Kool (2017), the determinants for the regressions were measured at the beginning of the respective sample period and treated as predetermined to mitigate the potential problems associated with endogeneity. In addition to this fixed effect is applied, and lagged explanatory variables are added. When estimating X on Y with the knowledge that X is lagged for one period, Y is unlikely to cause X. This obviates that X is endogenous to Y (Bellemare et al., 2017).

Another potential issue that can affect the performance of a country's economic growth is the presence of multicollinearity. This phenomenon can lead to higher standard errors in the results. Although it is expected that the correlation between the main effects and the interaction terms will be regular, it can also cause errors in the estimates. However, it does not affect their unbiasedness. Cuaresma, Doppelhofer & Feldkircher (2014) show that multicollinearity does not change the quality of the estimation results. Multicollinearity is not optimal, but some collinearity when using interaction effects is inescapable in the upcoming analysis and must be considered when interpreting the results. Multicollinearity might also be a problem between the variables GNE and GDPCF due to the way of measuring GNE. VIF-test control for multicollinearity between two variables (Verbeek, 2017). The VIF-test showed no indication of problems with multicollinearity between GNE and GDPCF. The VIF test was also computed for the other variables used in the regressions and the test showed no problem with multicollinearity.

6. Empirical results and analysis

This section presents empirical results for 21 Latin American countries spanning 1995 to 2019. The empirical investigation aims to estimate the effects of FDI on economic growth and TFP in two different regressions and investigate the channel through which FDI may benefit economic growth and TFP, by including control variables and interaction variables. Breusch–Pagan tests for heteroskedasticity reveals the need to use robust standard errors in the upcoming regressions in order to make a more robust interpretation from the regressions.

The empirical results are presented in Tables 2 and 3. In the first regression, the primary explanatory variable, FDI, was initially included, see column 2.1, and then other variables were added in every subsequent regression, see columns 2.2 to 2.6. The same method was used in the second regression, see Table 3. FDI was initially included, followed by the other variables in columns 2.2 to 2.6. For the upcoming presentation, we will mainly refer to columns 2.5 and 2.6 since it includes all variables.

A critical aspect to highlight is the number of observations, which increases the uncertainty interval. Although the study itself is credible, given the relatively short period and the fact that the number of observations dwindled as a result of a lack of data for some countries, the analysis may be treated with some caution. Including more control variables to better capture a host country's characteristics and a more extensive time dimension of the panel could potentially contribute to more reliable estimates of the effects of FDI on economic growth. Endogeneity problems may appear since BNP and FDI do affect each other. A country with a high BNP is more likely to have a higher amount of FDI, a circle effect.

6.1 OLS regression results

The regressions in this section are established from the four hypotheses presented in chapter 5.1. The first hypothesis on whether FDI contributes to TFP is analyzed in regressions 2.1 to 2.6. The second hypothesis, if FDI has a positive effect on economic growth, is analyzed in regressions 3.1 to 3.6. The third hypothesis if FDI and schooling interact positively for a sufficient level of schooling and negatively for a decent level of schooling for both TFP and economic growth is analyzed in the regressions 2.5 to 2.6 and the regressions 3.5 to 3.6. The fourth hypothesis, which is based on regressions 2.6 and 3.6, says that FDI and schooling will have a greater interaction effect than FDI and domestic investments.

An interaction effect refers to the role of a variable in the regression and its effect on the dependent variable. A variable that has an interaction effect will have a different effect on the dependent variable, depending on the level or the group of the third variable. In a regression analysis, you examine how one variable affects another. Occasionally, however, there may be a difference in variable effects among groups or levels. We might suspect that x influences y positively, for example. However, the effect may vary depending on what level or what group z is in - if z is high, then x gives a higher effect on y. This is an example of z interacting with x.

The results of the OLS regression with TFP as the dependent variable are reported in Table 2. FDI has in column 2.1 a positive and significant effect and no significance in columns 2.2 to 2.4 when control variables are added which makes it difficult to interpret the first hypothesis according to these regressions. Columns 2.5 and 2.6 shows that FDI has an initial negative and significant effect on TFP. In column 2.5 the coefficient is -58.635 and in column 2.6 the coefficient is -48.746. By just analyzing these results FDI tends to have a negative impact on TFP which goes against the first hypothesis.

In column 2.5 schooling has an initial negative effect on TFP. The interaction effect between FDI and schooling has a coefficient of 255.547 on a five percent significance level. The average level of education in Latin American countries from 2000 to 2018 is 22 percent, meaning 22 percent of the population has completed secondary school. On average a nation in Latin American countries receives 3.35 percent FDI of their GDP from 2000 to 2018. In column 2.5 the interaction effect states that if FDI increases by one unit, the interaction effect will be 56.22. [3] Since the coefficient for FDI states that TFP declines by -58.64 if FDI increases by one unit, the net effect is then obtained by adding 56.22 to the FDI coefficient and the average net effect, though, is negative (-2.38). [4] These results indicate: that for the average country in Latin America, the proportion of the population that has passed secondary school is too low to benefit from FDI on TFP. For each country, an increase in FDI will have a different effect depending on the percentage of the population that has completed secondary school. Although, the higher the percentage of the population that has completed secondary school the more positive or less negative effect will FDI have on TFP.

Analyzing the results in column 2.6, it can be concluded that the more well-educated population the more positive or less negative effect of FDI on TFP. Therefore, a country gains from TFP through FDI as long as more than 21.32 percent of its population has completed secondary school.[5] If the country has a larger proportion of its population that has completed secondary school than 21.32 percent, the effect of FDI on TFP will be positive. In countries where the proportion of the population that has passed secondary school is less than 21.32 percent the effect through FDI on TFP will be negative. In conclusion, the higher the percentage of people that have completed secondary school, the more positive or less negative effect FDI will have on TFP, this is in line with the third hypothesis.

[3] 255.447 * 0.22 = 56,22 - Interaction*average schooling
[4] -58.6+56.22 = -2.38
[5] The limit value: 58,635/255,547 = 0,22944

In column 2.6 the coefficient for schooling is initially negative while the interaction effect between domestic investments and schooling is positive. The fact that the initial effect of schooling is negative is surprising but since the interaction effect is significant on a five percent level and positive (183.679), most of the countries in Latin America will see a positive net effect since the interaction effect will be bigger than the negative initial effect. The initial value of domestic investments is -38.835 and when taking the average schooling level on 22 percent times the interaction effect, the net effect will be positive. [6]

The baseline findings of Domestic investments (GDPCF) are qualitatively intact in columns 2.3 to 2.5 but have an adverse effect when the second interaction variable (GDPCF*schooling) is included, see column 2.6. In countries where less than 21.14 percent of their population have passed the secondary school, data suggest that domestic investments will harm TFP since the net effect becomes negative if schooling is less than 21.14 percent. [7] Countries that have a higher proportion of the population than 21.14 percent that has passed secondary school will in comparison have a positive effect on TFP through domestic investment.[8]

In column 2.6, the interaction effect between FDI and schooling is 228.683, while the interaction effect between domestic investments and schooling is 183.679. This can be interpreted as when the human capital threshold is achieved, 21.32 percent for FDI and 21.14 percent for domestic investments, FDI tend to have a more significant impact on TFP than domestic investments, everything else equal.[9] In line with the fourth hypothesis, the interaction effect of FDI and schooling should be greater than the interaction between domestic investments and schooling. It can also indicate that FDI has a positive technology spillover effects for recipient countries, depending on their education level. Nevertheless, in contrast, domestic investments will start to positively affect a more decent level of human capital than FDI.

In column 2.6, it should be noted that GDP per capita lagged one period is measured as per US dollar. For example, Argentina had a GDP per capita of 7191 in 1990. If we change one

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[6] 183.679*0.22 = 40.41, 40.41>38.84
[7] The limit value: 38.835/183.679 = 0.2114
[8] 183.679*0.2114 = 38.82
[9] 48.746/228.683 = 0.2132 and 38.835/183.679 = 0.2114

unit, it means a change of one dollar. The coefficient estimated is 0.001 and is significant on a one percent level. The coefficient can be interpreted as if GDP per capita increases by one dollar, TFP will increase by 0.1 in its percentile ranking from 1 to 100 described in Table 1. The importance of understanding that a unit is a measure of its magnitude cannot be overstated. By one unit, Argentina's GDP per capita increases by one dollar. Therefore, the coefficient represents the effect of increasing GDP per capita by one dollar. When interpreting coefficients, one should not simply observe their size since when it comes to GDP per capita, one might assume that it must increase by 100 or 1000 dollars to be considered a meaningful transfer of GDP. If we believe that a change in 1000 dollars in GDP per capita would be a positive change, then we must multiply 1000 by 0.001. Although the effect may still be small, it is essential to understand why the coefficient has become so small in this instance.

Table 2. TFP as the dependent variable 2000-2018 with robust standard errors.

Regression	2.1	2.2	2.3	2.4	2.5	2.6
FDI.Lag1	45.007***	7.895	4.804	4.622	-58.635**	-48.746**
	(12.487)	(11.215)	(10.900)	(9.814)	(21.027)	(23.393)
GDPPC.Lag1		0.001***	0.001***	0.001***	0.001***	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GNE			-10.675	-10.626	-7.993	2.334
			(7.775)	(7.694)	(7.517)	(5.561)
WGI			0.039	0.041	0.048	0.031
			(0.041)	(0.041)	(0.036)	(0.038)
GDPCF			19.888**	19.706**	13.749*	-38.835*
			(8.363)	(8.078)	(7.355)	(21.916)
Inflation			-8.973**	-9.016**	-8.416**	-6.264
			(3.955)	(3.805)	(3.184)	(4.087)
Schooling				0.347*	-6.434	-41.286**
				(5.097)	(4.297)	(15.915)
FDI.L1*Schooling					255.547**	228.683**
					(79.673)	(84.583)
GDPCF*Schooling						183.679**
						(83.995)
Constant	28.075***	24.011***	29.887***	29.753***	29.507***	30.474***
	(0.476)	(0.780)	(7.423)	(7.538)	(7.209)	(7.567)
Observations	80	80	80	80	80	80
R-squared	0.352	0.489	0.626	0.629	0.664	0.681
F-test	12.99**	29.75***	10.88***	9.55***	9.9***	5.78***

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

The regression with GDP growth as the dependent variable, see Table 3, has substantially less significant findings than the regression with TFP as the dependent variable. FDI has a negative and significant impact on economic growth in columns 3.1 to 3.4. In column 3.4, the coefficient for FDI is -0.153 on a five percent level of significance and could indicate that FDI has a negative impact on economic growth. This result is not in line with the second hypothesis. Even though the result is significant, the regressions in columns 3.1 to 3.4 are likely to fall short because they do not include the interaction effects and make the interpretation unstable. This can be seen in columns 3.5 to 3.6. When adding the interaction effects of schooling and FDI, the results are no longer significant, and data can no longer conduct whether there is an impact of FDI on economic growth.

In column 3.6 the coefficient for domestic investments is 0.422 on a one percent level and the interaction effect between domestic investments and schooling is -0.774. Meaning that domestic investments affect GDP growth positively, but the positive effect diminishes with increasing education levels since the interaction effect between GDPCF and schooling is significant and negative. This result is in opposite to the results found in columns 2.6 when TFP was the dependent variable. Different results for TFP and economic growth is not in line with the Schumpeterian model. Since, the effect of FDI is not significant in column 3.6 it is also hard to conduct the fourth hypothesis.

Based on the results received from Table 3, the advantages of backwardness do not show any evidence of convergence. In the regression, education is included as a factor influencing GDP growth, meaning that a high education level would benefit GDP growth. Furthermore, a negative effect on GDP per capita would imply that all else being equal, a lower GDP per capita would lead to higher GDP growth, i.e., higher convergence. Due to this, we have already looked for convergence through regressions, but no evidence has been found.

Thus, convergence is viewed from a general perspective. If one looks at just club convergence, the countries converge into different clusters or groups. In other words, some countries converge into a high-income group and others into a low-income group. Therefore, it depends on how high- and low-income groups are defined. Using this regression, we can identify them based on their educational level. It is necessary, however, to examine what other factors control who becomes a member of the higher and lower groups if other factors are at play. As GDP per capita is the convergence effect, if it becomes harmful and significant, we will have a convergence effect when considering all other factors in the regression. Across all countries and years in the study, TFP averages 29.68, and to concretize that it is not evident that a low level of TFP automatically leads to higher growth we use two examples. In 2018 Argentina had a negative economic growth rate (-2.6 percent) and a TFP rate of 33.03. Brazil 2015 also had a negative economic growth rate (-3.5 percent) and a TFP rate of 31.56.

Table 3. GDP growth as the dependent variable, 1995-2019 with robust standard errors

Regression	3.1	3.2	3.3	3.4	3.5	3.6
FDI.Lag1	-0.179***	-0.228***	-0.160**	-0.153**	-0.104	-0.218
	(0.061)	(0.052)	(0.079)	(0.078)	(0.202)	(0.189)
GDPPC		-4.890	-1.270	-2.190	-2.270	-1.810
		(2.920)	(3.520)	(4.050)	(4.070)	(4.360)
GNE			-0.083**	-0.081*	-0.082*	-0.069
			(0.044)	(0.044)	(0.044)	(0.043)
WGI			0.000	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
GDPCF			0.248***	0.256***	0.259***	0.422***
			(0.069)	(0.074)	(0.070)	(0.083)
Inflation			-0.049	-0.054	-0.054	-0.064
			(0.032)	(0.033)	(0.033)	(0.035)
Schooling				-0.026	-0.021	0.133**
				(0.028)	(0.027)	(0.061)
FDI.L1*Schooling					-0.193	0.211
					(0.818)	(0.714)
GDPCF*Schooling						-0.774***
						(0.226)
Constant	0.037***	0.034***	0.059	0.066	0.065	0.019
	(0.002)	(0.003)	(0.048)	(0.047)	(0.046)	(0.051)
Observations	105	105	105	105	105	105
R-squared	0.002	0.001	0.182	0.208	0.207	0.213
F- test	8.44***	10.12***	7.37***	6.73***	5.83***	6.090***

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

6.2 Discussion

TFP and economic growth differ in many ways, and understanding the differences is vital to understanding the relationship. In a country with relatively high economic growth, TFP will likely be high as well. A measure of TFP is the level of GDP, while a measure of economic growth is the rate at which GDP increases each year. A change in TFP becomes more of a snapshot, while a change in GDP becomes more of a measure of growth. Since both productivity and economic growth are major components in the Schumpeterian model, we were interested in testing both TFP and GDP growth as dependent variables. It is important to note that TFP is more of a momentary measure and that many other elements influence economic growth. However, using economic growth as a measurement is difficult, as it depends on both past and present factors, and therefore the effect on TFP through FDI plays an important role.

According to previous research and the theoretical model, the results received in Table 2 were not surprising. The results also align with the first, third, and fourth hypotheses presented in chapter 5.1. Logically, the more well-educated the population is, the easier it is to absorb new technology from FDI, which in turn will positively affect TFP. The results concerning the different interaction effects were also expected since we believed that FDI would result in spillover effects compared to domestic investments.

The results received in Table 3 had substantially fewer coefficients that were significant, but some results are unexpected. The interaction effect between domestic investments and schooling showed significant and adverse effects, which were surprising because a more well-educated population would result in lower GDP growth. This was not in line with our hypothesis and not in line with the Solow-Swan model either. Due to the Solow-Swan model, it is surprising that the coefficient is negative since it is unlikely that domestic investments would harm GDP growth. Solow meant that the more we invest, the more positive effect we will get (Solow, 1956; Swan, 1956).

The theory of club convergence claims that a country with higher economic growth may have a lower TFP, and vice versa, than a country with lower economic growth (Aghion & Howitt, 2009). This can be explained by the implication that a country with higher economic growth begins with a lower level of GDP per capita. High GDP levels do not necessarily mean high economic growth. Due to the advantages of backwardness, countries further away from the technological leaders will grow more rapidly since they have more knowledge to adopt than countries closer to the technological frontier if they have the same productivity rate. This may be true for some regions but not Latin American countries from 1990 to 2019 (Worldbank 2022b).

7. Summary and conclusion

The purpose of this study was to investigate the role of FDI on the recipient countries' economic growth and the level of education in the country. To answer these questions, we built an econometric model based on a panel study (time-series and cross-sectional data), including data from 21 countries in Latin America spanning from 1995-2019. We also used a productivity measure (TFP) to get a more momentary picture and not only for long-run economic growth. The empirical work is based on the Schumpeterian model of endogenous growth, where technological progress is the primary determinant of the long-term growth rate of a country.

Our findings indicate that the more well-educated inhabitants the country has, the more positive or less negative will the effect of FDI. In this study, the human capital threshold for the countries in Latin America is 21.32 percent of its population has completed secondary school. We found that countries with a higher proportion of the population that has passed secondary school will see a more significant positive effect from FDI than domestic investments on TFP. This can indicate some sort of positive spillover effect from FDI to the countries in Latin America.

In summary, empirical research such as Borensztein et al. (1998) and Schumpeterian theoretical growth models imply that a country can absorb potential technological spillover effects if it has adequate human capital. In our study, we show that having the ability to absorb spillovers from FDI, the country requires a sufficient level of human capital. The results support the importance of human capital for the TFP in Latin American countries. Meanwhile, the results in this study are more divided on the effect of FDI on economic growth. In order to obtain a robust result on whether FDI positively impacts economic growth, future research could further analyze different regions simultaneously and investigate aspects that could impact the variables, for example, cultural aspects such as religion and the legal system. A more precise measure of human capital that controls for a more advanced level of education would also be desirable.

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Appendices

Table A. Foreign direct investment (1990-2019)

Net inflows (percent of GDP) and the nominal value in US dollar for Latin America.

Year	FDI as percentage of GDP	Nominal in billion US dollar
1995	1.565	2.6
1996	2.089	3.8
1997	2.665	5.3
1998	3.037	6.0
1999	4.336	7.6
2000	3.517	6.8
2001	3.338	6.3
2002	2.783	4.7
2003	2.152	3.7
2004	2.924	5.8
2005	2.715	6.5
2006	2.978	6.5
2007	3.240	1.1
2008	3.142	1.2
2009	2.163	7.7
2010	3.304	1.5
2011	3.274	1.7
2012	3.265	1.7

2013	3.287	1.7
2014	2.922	1.6
2015	3.206	1.4
2016	3.409	1.5
2017	3.043	1.5
2018	3.350	1.6
2019	2.937	1.4

Table B.1. Foreign direct investment (percent of GDP)

Net inflows (% of GDP) for Argentina, Barbados, Belize and Bolivia (1990-2019).

Year	Argentina	Barbados	Belize	Bolivia
1995	2.174	2.878	3.393	5.848
1996	2.553	0.670	2.584	6.409
1997	3.128	1.129	1.826	9.218
1998	2.439	1.035	2.561	11.171
1999	8.461	1.611	8.007	12.197
2000	3.666	2.409	3.553	8.768
2001	0.806	2.996	7.019	8.669
2002	2.199	7.350	2.731	8.558
2003	1.295	5.755	-1.103	2.442
2004	2.505	6.629	10.542	0.746
2005	2.649	10.212	11.418	-2.499
2007	2.251	10.193	10.940	2.792

2008	2.690	12.855	12.544	3.073
2009	1.206	7.972	8.242	2.440
2010	2.675	9.389	6.949	3.165
2011	2.045	9.867	6.500	3.584
2012	2.807	11.454	12.682	3.914
2013	1.779	2.225	5.832	5.707
2014	0.962	16.048	8.417	1.990
2015	1.977	14.573	3.409	1.681
2016	0.585	11.540	1.822	0.988
2017	1.789	4.138	1.725	1.899
2018	2.233	4.740	6.466	0.751
2019	1.471	4.060	4.828	-0.530

Table B.2 Foreign direct investment (% of GDP)

Net inflows (% of GDP) for Brazil, Chile, Colombia, Costa Rica (1990-2019)

Year	Brazil	Chile	Colombia	Costa Rica
1995	0.632	4.026	1.047	2.910
1996	1.476	6.127	3.203	3.656
1997	2.150	6.149	5.215	3.246
1998	3.341	5.644	2.874	4.491
1999	4.734	11.589	1.750	4.346
2000	5.034	6.211	2.439	4.818
2001	4.148	5.872	2.588	3.892
2002	3.254	3.627	2.178	4.362
2003	1.813	5.263	1.818	4.484
2004	2.714	6.860	2.661	5.823
2005	1.734	6.101	7.029	7.628

2007	3.191	7.808	4.310	8.337
2008	2.991	10.282	4.362	7.909
2009	1.888	8.083	3.457	5.252
2010	3.730	7.379	2.244	5.064
2011	3.915	10.176	4.373	6.392
2012	3.755	11.741	4.055	5.709
2013	3.042	8.011	4.242	6.291
2014	3.571	9.082	4.243	6.233
2015	3.592	8.610	3.960	5.236
2016	4.137	4.945	4.900	4.453
2017	3.338	2.217	4.393	4.833
2018	4.077	2.627	3.381	4.829
2019	3.693	4.518	4.330	4.221

Table B.3 Foreign direct investment (% of GDP)

Net inflows (% of GDP) for Dominican Republic, Ecuador, El Salvador, Guatemala (1990-2019).

Year	Dominican Republic	Ecuador	El Salvador	Guatemala
1995	2.509	1.852	0.426	0.513
1996	0.736	1.981	..	0.491
1997	2.042	2.571	0.578	3.549
1998	3.086	3.109	10.082	6.941
1999	6.075	3.301	1.912	5.047
2000	4.069	-0.128	1.471	-4.088
2001	4.249	2.201	2.271	-5.088
2002	3.412	2.744	3.711	-4.974
2003	2.881	2.687	1.066	0.090

2004	4.186	2.287	2.647	1.363
2005	3.126	1.189	3.478	2.016
2007	5.124	0.380	9.114	2.560
2008	5.670	1.712	5.021	1.900
2009	3.513	0.494	2.095	1.346
2010	3.379	0.239	-0.613	2.710
2011	3.787	0.815	0.604	1.870
2012	5.629	0.645	2.011	2.823
2013	2.552	0.764	1.115	2.872
2014	3.551	0.759	2.241	2.433
2015	3.130	1.332	2.110	1.935
2016	3.324	0.765	1.982	1.280
2017	4.497	0.604	2.017	1.393
2018	3.208	1.291	1.586	1.260
2019	3.181	0.901	2.589	1.520

Table B.4 Foreign direct investment (% of GDP)

Net inflows (% of GDP) for Haiti, Jamaica, Mexico, Nicaragua (1990-2019).

Year	Haiti	Jamaica	Mexico	Nicaragua
1995	0.263	1.548	2.646	2.147
1996	0.141	1.835	2.235	2.785
1997	0.120	1.854	2.564	4.633
1998	0.289	3.666	2.423	4.707
1999	0.722	5.341	2.323	6.946
2000	0.194	4.660	2.597	5.218
2001	0.069	6.270	3.972	2.822
2002	0.094	4.566	2.611	3.903

2003	0.286	7.248	2.492	3.782
2004	0.098	5.498	3.216	4.314
2005	0.362	5.673	2.897	3.814
2007	0.782	6.343	2.955	5.142
2008	0.284	10.041	2.683	7.383
2009	0.478	4.003	2.184	5.229
2010	1.501	1.405	2.886	5.593
2011	0.915	1.196	2.020	9.579
2012	1.138	2.791	1.517	7.365
2013	1.087	3.819	3.987	8.787
2014	0.654	4.188	2.179	9.064
2015	0.712	6.519	3.057	7.580
2016	0.750	6.592	3.606	7.445
2017	2.493	6.002	2.867	7.511
2018	0.638	4.924	3.096	6.431
2019	0.507	4.203	2.343	3.993

Table B.5 Foreign direct investment (% of GDP)

Net inflows (% of GDP) for Panama, Paraguay, Peru, Uruguay, Venezuela (1990-2019).

Year	Panama	Paraguay	Peru	Uruguay	Venezuela
1995	2.938	1.043	4.796	0.811	1.287
1996	4.339	1.428	6.282	0.667	3.095
1997	12.290	2.317	3.679	0.472	7.225
1998	11.362	3.678	2.962	0.646	5.501
1999	8.602	0.987	3.866	0.981	2.993
2000	6.728	1.217	1.565	1.152	4.015
2001	4.854	1.168	2.199	1.485	3.014

2002	1.902	1.256	3.936	1.322	0.819
2003	7.672	-0.750	2.273	3.343	1.881
2004	8.512	0.976	2.395	2.577	1.324
2005	6.745	0.068	3.390	4.761	1.684
2007	10.443	0.588	5.374	5.804	1.892
2008	9.501	1.211	5.743	7.054	0.659
2009	4.003	0.638	5.322	5.062	-0.345
2010	8.659	2.544	5.731	5.439	0.403
2011	12.672	1.724	4.473	5.609	1.850
2012	8.365	2.193	7.362	12.473	1.308
2013	8.331	0.789	4.757	1.715	0.578
2014	9.984	2.038	2.123	7.138	0.235
2015	9.464	1.396	3.865	5.018	*
2016	9.063	1.601	3.546	-0.901	*
2017	6.563	1.278	3.513	4.182	*
2018	8.112	0.482	2.638	2.417	*
2019	6.645	0.907	2.085	2.301	*

*Venezuela has no reported values for FDI from 2015-2019 due to political instability and missing statistics.