ESTUDIOS ECONÓMICOS
ISSN: 0425-368X
ISSN: 2525-1295
estudioseconomicos@uns.edu.ar
Universidad Nacional del Sur
Argentina

Fraga, Gilberto Joaquim

INVESTMENT CLIMATE AND FOREIGN DIRECT INVESTMENT IN LATIN AMERICAN COUNTRIES: FIRM-LEVEL EVIDENCE°

ESTUDIOS ECONÓMICOS, vol. XXXIX, núm. 79, 2022, Julio-Diciembre, pp. 103-126
Universidad Nacional del Sur
Bahía Blanca, Argentina

INVESTMENT CLIMATE AND FOREIGN DIRECT INVESTMENT IN LATIN AMERICAN COUNTRIES: FIRM-LEVEL EVIDENCE°

CLIMA DE INVERSIÓN E INVERSIÓN EXTRANJERA DIRECTA EN PAÍSES DE AMÉRICA LATINA: EVIDENCIA A NIVEL DE FIRMA

*Gilberto Joaquim Fraga**

recibido: 30 julio 2021 – *aceptado:* 5 diciembre 2021

Abstract

This paper analyzed the relationship between the investment climate and foreign direct investment (FDI) using a sample of 18 Latin American countries. The main results show that obstacles related to financial infrastructure and customs clearance might reduce the probability of a country receiving FDI, while physical infrastructure obstacles do not significantly affect the influx of FDI. The disaggregated data show that financial infrastructure is important for attracting both vertical and horizontal FDI. On average, policies in Latin America that minimize financial obstacles and reduce the time it takes to clear customs will increase the likelihood of attracting FDI.

Keywords: developing countries; FDI; export.
JEL code: F21; F23

° Fraga, G. J. (2022). Investment climate and foreign direct investment in Latin American countries: firm-level evidence. *Estudios económicos,* 39 (79), pp.103-126. DOI. https://doi.org/10.52292/j.estudecon.2022.2809

* Universidade Estadual de Maringa, Brazil. ORCID: https://orcid.org/0000-0002-6320-3847 E-mail: gjfraga@uem.br.

The author would like to thank the funding from CAPES Foundation of Ministry of Education of Brazil (000476/2015-03).

Resumen

Este trabajo analiza la relación entre el clima de inversión y la inversión extranjera directa (IED) utilizando una muestra de 18 países latinoamericanos. Los principales resultados muestran que los obstáculos relacionados con la infraestructura financiera y el despacho de aduanas pueden reducir la probabilidad de que un país reciba IED, mientras que los obstáculos de infraestructura física no significan la entrada de IED. Los datos desglosados muestran que la infraestructura financiera es importante para atraer IED tanto vertical como horizontal. En promedio, las políticas en América Latina que minimicen los obstáculos financieros y reduzcan el tiempo necesario para el despacho de aduanas aumentarán la probabilidad de atraer IED.

Palabras clave: países en desarrollo; IED; exportador.
Códigos JEL: F21; F23

INTRODUCTION

In recent years, foreign direct investment (FDI) has greatly increased in Latin America. However, this good aggregated performance does not effectively represent all the countries, because each one has its own dynamic level of international integration. In 2010, the share of global FDI in Latin American countries was roughly 26.20% of the total FDI in developing nations, but these foreign firms are unequally distributed among the respective countries. Despite some controversial effects on host states/regions, empirical evidence shows that FDI has beneficial effects on local firms and the economy at large (Dollar et al., 2006; Kinda, 2010; Alvarado et al., 2017). For instance, the benefits of FDI derive from the ability of local firms to have contact with foreign ones (Alfaro et al., 2004; Javorcik, 2004), which allows for the transfer of technological and management knowledge. Indeed, some authors believe that increasing international integration can contribute to economic growth.

A well-established conceptualization of FDI determinants is the eclectic paradigm (Dunning, 1980). This paradigm presents a framework in which the determinants of multinational enterprise (MNE) investment in foreign countries can be analyzed. According to this model, MNEs make FDI decisions based on ownership, location, and internalization advantages (OLI). This analysis focuses on the second factor of OLI[1], which indicates that MNEs invest abroad to obtain location advantages (due to government policies, lower costs of production factors and trade, etc.). Firms seeking this kind of advantage supply the host country market through an affiliate, which is referred to as horizontal FDI. Furthermore, MNEs can move entire production processes or segments of them to obtain low cost benefits, and this is known as vertical FDI. Kinda (2010) noted that the determinants of export- and market-oriented MNEs might differ. Thus, the effect of the same variable that affects trade costs, for example, could vary depending on whether vertical or horizontal FDI is used (Glass, 2008). Because most of the available data sets include aggregate data and it is difficult to obtain data on vertical and horizontal FDI, most studies use total FDI.

Many investigations on developing countries and Latin American ones have primarily adopted/applied macroeconomic level data (Amal and Seabra, 2007; Bengoa and Sanchez-Robles, 2003; Montero, 2008; Arbeláez and Ruiz, 2013; Williams, 2015) to analyze the relationship between the macroeconomic conditions of host

[1] See Figure A1 in the Appendix.

countries and FDI inflow. Other studies have focused on the country-level effects of political and economic reforms (Biglaiser and DeRouen, 2006; Tuman, 2006). Recently, other aspects that might affect FDI inflow in Latin America have been examined; for example, Blanco (2012) analyzed the spatial interdependence and surrounding potential market of FDI among Latin American countries. The investment climate has received attention from studies at the macroeconomic level (Corcoran and Gillanders, 2015; Sekkat and Veganzones-Varoudakis, 2007) and at the microeconomic one (Dollar et al., 2006; Kinda, 2010); however, they did not center on Latin American nations. Although developing countries and Latin America have been analyzed, only Brazil, Honduras, Nicaragua, and Peru have been considered (Dollar et al., 2006). However, it is important to study the effect of the investment climate while examining a large sample of countries in the Latin American region at the microeconomic level.

Given that many governments are interested in attracting more FDI, the following unanswered questions arise: does the investment climate actually matter for FDI in Latin America? If so, does this determinant vary according to the type of FDI? We used a large sample of companies that operate in this region to assess three potential obstacles (financial infrastructure, physical infrastructure, and customs clearance) to FDI related to firms' operation. This research contributes to the existing literature by analyzing the impact of countries on improving their investment climate and, more precisely, on FDI. Unlike other studies that use macroeconomic-level analysis, this article is the first one to consider the region as a whole at the firm-level data set, which should allow researchers and policymakers to better understand FDI inflows into Latin America.

This paper is structured as follows. Section 1 presents an overview of the data and preliminary observations. The second section describes the empirical analyses and results. The last section provides the final remarks.

I. OVERVIEW OF DATA AND PRELIMINARY OBSERVATIONS

The data were obtained from the Enterprise Investment Climate Survey conducted in developing countries by the World Bank with local partners between 2009 and 2010. This survey is particularly important for analyzing Latin American countries, because there is a lack of standardized firm-level data available for this region. The data set is part of an investment climate database collated by the World Bank and is accessible to researchers, subject to confidentiality restrictions and agreements. The investment climate that we present is based on a large, random

sample of firms that operate in specific sectors in sixty regions of eighteen Latin American countries (Table 1). In addition to the investment climate, the survey collects data on production variables and firm characteristics. The analysis includes 12,084[2] firms, of which 12.06% are foreign. The variables for firm characteristics include information on the share of foreign ownership in firm capital, but do not provide details related to the volume of foreign investment. The dependent variable, FDI, takes value one when at least 10% of the firm's capital is foreign (following the International Monetary Fund [IMF] definition of FDI) and zero, otherwise.

The explanatory variables for investment climate include the following aspects/factors: i) number of days to clear customs (exports); ii) physical infrastructure (number of power outages experienced in a typical month in the last fiscal year, days to obtain a telephone connection, days of inventory for the most important input); iii) financial infrastructure (working capital from bank loans; loans from non-bank financial institutions, which include microfinance institutions, credit cooperatives, credit unions, or finance companies; investment financed (%) by private or state commercial bank). The variables for firm characteristics include age, size of the firm (small, medium, and large), and export status. The variable used to control for the characteristics of the region is sector agglomeration. Fixed effects are included to control for the non-observable characteristics of Latin American countries. The share of exporting sales is used to measure horizontal and vertical FDI, which means that some firms are export-oriented and others, market-oriented. This study considered fourteen sectors, including ten manufacturing ones (textiles, garments, food, metals and machinery, electronics, chemicals and pharmaceuticals, wood and furniture, non-metallic and plastic, auto and auto components, and other manufacturing) and four service sectors (retail and wholesale, hotels and restaurants, construction, and other services). In choosing the explanatory variables, we took into account not only their economic relevance, but also the number of non-missing values. Table A1 in the Appendix presents the variables and their definitions.

Table 1 provides the distribution of surveyed firms by FDI status and country. The sample shows important variations in the share of FDI firms compared to the total number of firms surveyed, ranging from 25.61% in Guyana and 19.61% in Panama to 9.13% in Colombia and 5.62% in Brazil. While 1,357 are foreign firms, the capital of 9,907 companies is held by domestic owners.

[2] In total, 631 firms did not answer the question about ownership in the survey.

Table 1. Distribution of surveyed firms (foreign and domestic) at the country level

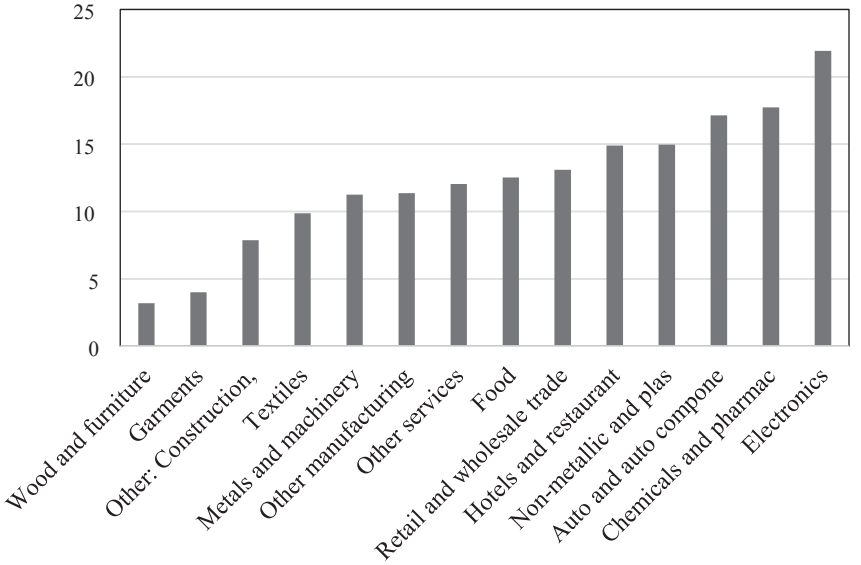
Country	Survey year*	Non-FDI firms (%)	FDI firms (%)	Total number of firms
Guyana	2010	74.39	25.61	164
Panama	2010	80.39	19.61	362
Jamaica	2010	81.69	18.31	366
El Salvador	2010	81.84	18.16	358
Ecuador	2010	83.06	16.94	366
Costa Rica	2010	83.80	16.20	537
Bolivia	2010	86.55	13.45	357
Guatemala	2010	86.93	13.07	589
Argentina	2010	86.99	13.01	1,053
Chile	2010	87.21	12.79	1,032
Paraguay	2010	88.06	11.94	360
Peru	2010	88.19	11.81	999
Nicaragua	2010	88.92	11.08	334
Honduras	2010	89.08	10.92	357
Uruguay	2010	89.22	10.78	603
Mexico	2010	90.60	9.40	1,478
Colombia	2010	90.87	9.13	942
Brazil	2009	94.38	5.62	1,209
Total		87.94	12.06	11,466

Note: *some countries, Brazil for example, do not present a survey in the last decade.
Source: Authors' elaboration based on the investment climate survey conducted by the World Bank (2015).

Although the overall inflow of FDI into Latin America is strong, it is unequally distributed among countries. These differences are explained not only by variations in the size of markets and the implementation of market-oriented reforms (Williams, 2015), but also by the investment climate within countries.

The proportion of FDI varies among the different sectors, and Figure 1 presents this distribution. While manufacturing sectors that are considered to add high value, such as electronics, chemicals, and pharmaceutical, have attracted more foreign firms, others, such as wood and furniture and garments, have encouraged fewer investors. In this sample, 22% of firms in the electronics sector and 18% in the chemicals and pharmaceuticals one are either partly or fully owned by foreign investors. Of the wood and furniture and garments sectors, 3% and 4% are either partly or fully owned by foreign investors, respectively. On average, for 12% of firms in the sample, foreign investors own at least 10% of the capital. Kinda (2010) argued that high-value sectors attract more foreign investors due to their expected profit and the large amount of financing required by these sectors.

Figure 1. Share (%) of foreign firms by sector – Latin America.

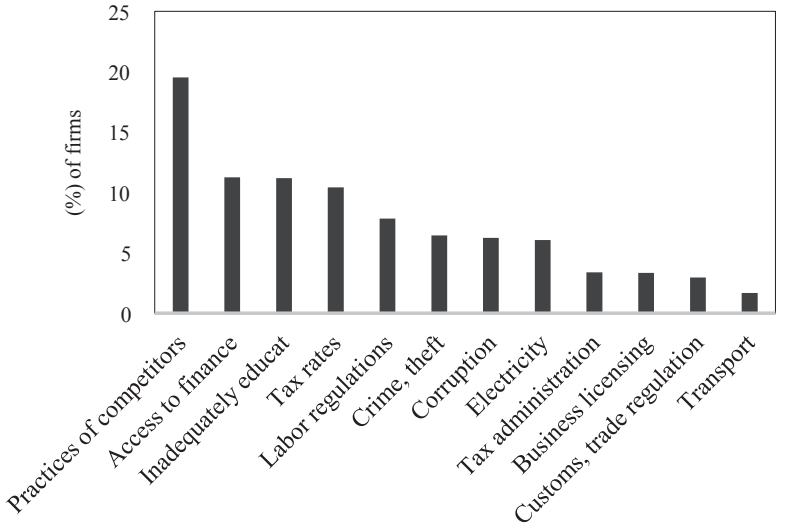


Source: Authors' elaboration based on the investment climate survey conducted by the World Bank (2015).

Foreign and domestic firms in developing countries face many obstacles when investing and operating their businesses. Regarding firms' perceptions, the practices of competitors in the market and finance were ranked as the most serious obstacles for investment for both local and foreign firms (Figure 2). In relation to the finance sector, Ramalho et al. (2014) noted that, since the 1990s, countries in

Latin America and the Caribbean (LAC) have recorded growth in the financial market as well as financial inclusion. Access to bank loans sufficiently captures the ability of firms to obtain external financing (Hallward-Driemeier et al., 2006). Equally important to firms is trade regulation; data reveal that FDI firms are generally located where it takes fewer days to clear customs. In alignment with Anderson and Gonzalez (2013), we believe that if the local investment climate is poor, there will be fewer opportunities to attract foreign investors.

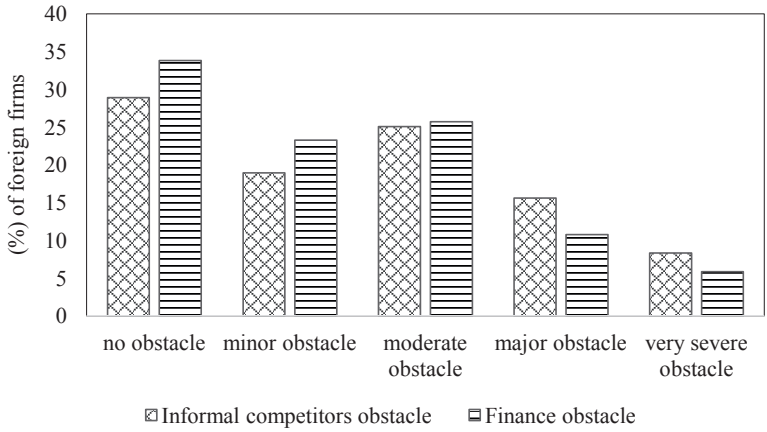
Figure 2. Ranking of the most serious obstacles for firms (all firms).



Source: Authors' elaboration based on the investment climate survey conducted by the World Bank (2015).

To aid the empirical analysis, in Figures 2 and 3, we used more objective variables (physical infrastructure constraints, finance access, days to clear customs [trade], inefficiency of government indexes) instead of firms' perceptions (such as informal competitors). For instance, rather than asking managers to use a scale to rate whether the quality of the financial system is an obstacle for the business, the survey collects and reports data on the percentage of working capital that is financed by non-commercial banks. Furthermore, foreign firms are more attracted to environments where there are fewer obstacles related to practices of competitors and finance. Figure 3 shows that more than 50% of firms consider both variables with some obstacle level. The use of these more objective variables should minimize endogeneity problems.

Figure 3. Distribution of foreign firms and the main obstacles.



Source: Authors' elaboration based on the investment climate survey conducted by the World Bank (2015).

We have provided an overview of the data set and descriptive figures that indicate where foreign firms prefer to locate their plants; however, to expound on the initial findings, the next section presents an econometric analysis that includes other control variables.

II. EMPIRICAL ANALYSIS

II.1 Method and econometric specification

In contrast to prior studies that focus on the choice of potential FDI location, this article aligns with more recent investigations that analyze the probability of firms being foreign. Typically, the dependent variable takes value one if foreign firms choose a specific country for the location of a new affiliate and zero, otherwise. Our study assumed that the characteristics of regions and countries differ across Latin America, used a sample that includes all the firms that operate in each country, and estimated the probability of firms being foreign. In addition, we analyzed the relationship between FDI and the local investment climate, while controlling for certain firm characteristics. More precisely, this article investigated the effect of investment climate variables on the investment choices of foreign corporations. We attempted to probe that countries and regions within nations with

good investment climates will attract more foreign firms. This aspect relates to "location" in the extended Dunning (1980) framework (Figure A1 in the Appendix), which indicates that MNEs invest abroad to obtain location advantages.

The proposed empirical equation is similar to that of former studies and can be written such as Equation 1. In line with the literature (Kinda, 2010), we used the instrumental probit (IV probit)[3] in order to overcome the endogeneity problem and obtain consistent estimates.

$$FDI_{ijk} = \beta_1 IC_{ijk} + \beta_2 X_{ijk} + \mu_i + \varepsilon_{ijk} \quad (1)$$

where FDI_{ijk} is the dependent variable, which indicates if firm k in country i and sector j is foreign-owned or local. Then, in accordance with the IMF definition of FDI, this variable can take the following values:

$$FDI_i = \begin{cases} 1 if at least 10\% of the firm's capital is foreign \\ 0 otherwise \end{cases}$$

IC_{ijk}, is a matrix of objective variables[4] that represents investment climate constraints (the physical infrastructure, the financial infrastructure, and customs clearance of international trade). X_{ijk}, is a matrix of other determinants of firm location. Following the literature, we included the firm's age to represent the background of the firm (Ottaviano and Martincus, 2011) and size to capture scale and efficiency (Bernard and Jensen, 2004). In alignment with Kinda (2010) and Manole and Spatareanu (2015), we also considered agglomeration. The age of a firm in a host country is calculated as the difference between the year of the survey and the year that the firm began operations. The agglomeration effects are represented by the number of foreign firms in a given sector in a specific region. This variable represents the average attractiveness of each specific region and might control for the direct effect of the regional-sectoral investment climate on FDI. Table A1 lists all the variables and their definitions. and are country effects and error terms, respectively. We took into account the non-observable differences among countries by including a dummy variable for fixed effects.

This study used principal components analysis (PCA) methods to obtain an aggregate index that represents different variables of the investment climate. PCA

[3] For details, see Cameron and Trivedi (2005).

[4] In choosing the explanatory variables, we considered not only their economic relevance, but also the number of missing values.

is a statistical procedure that applies an orthogonal transformation to convert a set of possibly correlated variables in an index of the principal components. The first principal component accounts for the most variability in the data (see Hamilton, 2009); this method is applied to address potential collinearity. To explain a single aspect, the surveys use many variables with similar meanings. For instance, to measure obstacles related to finance services, some of the variables included are loans from private or state commercial banks, the share of working capital, and loans from informal sources and non-bank financial institutions. Therefore, the introduction of all these variables in a single regression equation leads to a collinearity problem, which can be solved in two ways: using an aggregated PCA index or applying a single variable instead of a set of variables. For this study, we chose the former. Kinda (2013) noted that using a firm-level data set could also lead to endogeneity problems arising from measuring errors and reverse causality. This can be corrected by employing investment climate variables that are based on objective information; therefore, we applied variables that are not founded on the opinion of the firms' representative. Foreign firms (because they are more productive) might also be less sensitive to investment climate obstacles than local and less productive ones (on average), and this could affect their perception regarding the impact of the obstacles.

To address the potential problem of endogeneity, we used instruments that represent the sector-region averages for each investment climate variable that is considered endogenous. A similar procedure to develop instruments was adopted by Kinda (2010) and Manole and Spatareanu (2015). We applied sector-region instruments because of the small number of foreign firms in the sample. Of those operating in Latin America, roughly 12% are foreign-owned; therefore, the average of the variables for a certain location are dominated by local firms, and they could be considered partially exogenous (Manole and Spatareanu, 2015). By controlling for location-average, we expect that the variables for investment climate should essentially represent firm-level information. As an instrument for the financial access variable, we used the information regardless of whether or not a firm's annual financial statements were reviewed and certified by an external auditor. The statistics on the validity of the instruments are presented in the next section.

II.2. Results

To assess the relationship between the investment climate variables and FDI, we estimated the instrumental probit (IV probit) for FDI across all sample firms for which we have available data. We sought to analyze the relationship between

the investment climate and the probability that a randomly chosen firm in a given sector and region is at least 10% foreign-owned (FDI). The linear probability model (two-stage least squares (2SLS)) was also estimated to run instruments diagnostics, although it has some disadvantages.

The impact of the investment climate variables on the probability of receiving FDI was estimated in three stages (Table 2). First, we regressed the impact of the index of financial infrastructure constraints, and found that it affects FDI negatively and significantly. According to the estimation procedure (IV probit and IV-2SLS), the results are robust both with and without fixed-effect controls for the country. The estimates reveal that an increase in financial constraints decreases the probability of the country receiving FDI. Consequently, improvements in the local financial infrastructure may create opportunities for firms and consumers in the credit market, which would attract foreign firms. For instance, establishing an FDI firm in a given region might attract other local ones that could provide inputs or services to the FDI firm. An effective financial market would be important for the operation of these potential new firms. Furthermore, Buch et al. (2014) found that finance constraints have a direct effect on FDI.

Regarding physical infrastructure obstacles, unexpectedly, the results show that they do not statistically and significantly affect FDI in any of the specifications, although the coefficient is negative. In fact, roughly 58% of FDI firms in this sample are large (100 employees or more) and could overcome those obstacles. The effect of the customs clearance variable, which is a proxy for trade regulation, is also not statistically significant. However, this variable could affect export and non-export firms differently; therefore, we will focus our analysis on vertical and horizontal FDI to identify what kind of firm might encourage an improvement in customs clearance.

Despite the use of control variables, the estimates indicate that, on average, large and young firms are more likely to be foreign. The agglomeration variable captures the attractiveness effect in a specific region and sector, and the results reveal that FDI has been encouraged for the region with more firms, which means that firms benefit from their neighborhood. All the results regarding the characteristics of firms are consistent with the literature (see Kinda, 2010; Yeaple, 2009).

As the explanatory variables (investment climate) are based on the responses of firms, endogeneity may be an issue, as discussed above. The soundness of the results depends on the quality of the instruments used.

To check the validity of the instruments,[5] we performed the following statistical tests on the first stage regressions: partial R^2, Shea partial R^2, partial F-statistics, and the Cragg-Donald weak instruments test. Since we obtained an F statistic that is considerably larger than the critical value of 10 that is generally suggested, the proposed instruments do not seem to be weak (Cameron and Trivedi, 2005). The result of the Cragg-Donald test exceeds the critical value recommended by Stock and Yogo (2002); therefore, we are willing to tolerate distortion for the result of 5% for the Wald test because the true size can be a maximum of 10%. Thus, the estimates suggest that the null hypothesis regarding weak instruments is rejected. Furthermore, the estimates of the 2SLS and IV probit might not be directly compared. To do this, we need to rescale the parameters; however, for our purposes, this is not necessary.

II.2.1. Disaggregate analyses and robustness checks

To conduct a further analysis and robustness checks, we split the sample into exporters and non-exporters. The estimates shown in Table 3 repeat the same specifications in Table 2, but we disaggregated export-oriented (vertical FDI) and market-oriented (horizontal FDI) firms to decompose the previous results. Export firms represent foreign ones that export at least a share of their production. The second type of foreign firms, non-export ones, sell their goods wholesale to the domestic market and are present in all countries of the sample. We assessed how the investment climate variables affect the probability of a random firm being foreign and either an exporter or a foreign non-exporter. Some of the results are quite similar to the aggregated ones; however, others change with the export status of firms.

First, the index of the financial infrastructure constraints is important for attracting foreign firms; however, it is more significant for vertical FDI (foreign export firms). These findings mean that improvements in the local financial infrastructure may create opportunities for firms and consumers in the credit market, which would attract foreign firms. These results are consistent with localization advantages in the extended OLI framework. For the IV probit for non-export firms, the estimate of the coefficient retains the original sign; however, it is no longer significant. Similar to the previous results, neither vertical FDI nor horizontal FDI are affected by the index of physical infrastructure.

[5] See Cameron and Trivedi (2005).

Table 2. Basic model. Dependent variable: FDI

	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit
VARIABLES	(1)		(2)		(3)		(4)	
Financial Infrastructure	-0.0309***	-0.154***	-0.0309**	-0.137				
	(0.00855)	(0.0528)	(0.0123)	(0.0922)				
Physical Infrastructure					-0.00837	-0.0590		
					(0.0140)	(0.104)		
Ccustoms clearance							-0.000161	-0.000462
							(0.00137)	(0.00478)
Firm age	-0.000550**	-0.00219**	-0.00064***	-0.00244**	-0.000285	-0.00123	-0.000943**	-0.00289**
	(0.000244)	(0.00101)	(0.000246)	(0.00102)	(0.000420)	(0.00201)	(0.000427)	(0.00135)
Medium	0.0702***	0.532***	0.0689***	0.536***	0.0584***	0.703***	0.112***	0.540***
	(0.00818)	(0.0712)	(0.00835)	(0.0743)	(0.0115)	(0.145)	(0.0223)	(0.124)
Large	0.252***	1.275***	0.255***	1.303***	0.223***	1.464***	0.262***	1.015***
	(0.0117)	(0.0728)	(0.0124)	(0.0824)	(0.0185)	(0.143)	(0.0229)	(0.121)
Agglomeration	0.000454***	0.00216***	0.000259***	0.00127***	0.000498**	0.00323**	0.000537**	0.00174**
	(8.16e-05)	(0.000351)	(9.02e-05)	(0.000393)	(0.000218)	(0.00134)	(0.000230)	(0.000720)

Constant	0.0156**		0.0386**		0.00520		0.0989***	
	(0.00795)		(0.0168)		(0.0280)		(0.0382)	
Country FE			Yes	Yes	Yes	Yes	Yes	Yes
Wald (chi2)	547.43	473.97	627.35	549.82	200.85	189.82	179.04	129.87
(%) Correct prediction		85.43		85.40		88.59		74.81
Weak instruments statistics								
Partial R^2	0.16		0.09		0.180		0.217	
Shea partial R^2	0.163		0.09		0.180		0.217	
Partial F	638.07		353.19		26.23		165.88	
[p-value]	0.00		0.00		0.00		0.00	
Cragg-Donald statistic	632.13		307.86		436.49		647.52	
Critical value (10%)	19.93		19.93		16.38		16.38	
Observations	6,513	6,513	6,513	6,513	2,051	2,051	2,358	2,358
No. of countries	18	18	18	18	18	18	18	18

Notes: Robust standard errors appear in parentheses. The reference for size dummies is that small refers to less than 20 employees. Coefficients reported for the probit regression are marginal effects. Significance at: *** p<0.01, ** p<0.05, * p<0.1.

The results for the first stage regressions (not reported for convenience) are available upon request.

Since export firms tend to be larger rather than smaller, it makes sense that they are not affected by physical infrastructure constraints. These firms could invest in electrical systems to mitigate the effect of power outages, as well as in communication systems and inventory management.

The customs clearance variable (proxy for trade facilitation) significantly affects only non-export firms, which means that, on average, reducing the time (the number of days) to clear customs increases the likelihood of attracting horizontal FDI, but not vertical FDI, because it would rise trade costs. In fact, this result may have practical implications for developing countries: regions with higher customs might encourage foreign firms that seek to supply local markets, which is compatible with their interest in protecting the local market. There is theoretical support for these findings in the horizontal FDI theory. The typical models of horizontal FDI involve making a choice regarding fixed and trade costs at the plant-level; thus, if trade costs are higher, more horizontal FDI might be attracted (Glass, 2008).

Regarding the control variables, our findings indicate that, on average, large firms are more likely to have received both vertical and horizontal FDI, and firm age has a negative effect on both types of FDI. The agglomeration variable captures the attractiveness of FDI in a specific region and sector, and the results reveal that vertical and horizontal FDI are more likely in the regions that have more firms, which indicates that there are positive spillovers from agglomeration. The soundness of the results depends on the quality of the instruments that have been used. According to the results presented in Table 2, it does not appear that weak instruments were applied for the vertical and horizontal FDI estimates, since the partial F and Cragg-Donald statistics are higher than the critical values (Table 3).

Column (6) shows a small and negative coefficient (-0.08) for customs clearance (trade facilitation proxy) and a negative predictive value for FDI, which means that this acts as a disincentive for foreign firms. The average value of this variable in the sample is 8.48, which represents eight and a half days. Using this estimate as a baseline, we can conduct an experiment by keeping the other variables at their average values and reducing the average number of days to clear customs to obtain the change in the magnitude of the effect on the likelihood of a firm being FDI. In Chile, the most developed[6] country in Latin America, on average, customs clearance takes roughly 5.19 days; in Brazil, which has the largest economy in the region, on average, it takes more than 15 days (15.87); in Colombia, 8.70 days; in Mexico, 7.80 days; and in Argentina, 7.10 days.

[6] Considering the GDP per capita.

Table 3. Dependent variable: Vertical and Horizontal FDI

	Exporter		Non-exporter		Exporter		Non-exporter	
	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit
Variables	(1)		(2)		(3)		(4)	
Financial Infrastructure	-0.0791***	-0.2740*	-0.0217*	-0.1280				
	(0.0270)	(0.154)	(0.0130)	(0.126)				
Physical infrastructure					0.00763	0.0564	-0.0078	-0.1000
					(0.0542)	(0.206)	(0.0111)	(0.140)
Customs clearance								
Firm age	-0.00156***	-0.00453***	-0.000323	-0.00153	-0.00156*	-0.00523	0.000399	0.00241
	(0.000504)	(0.00160)	(0.000269)	(0.00137)	(0.000917)	(0.00333)	(0.000438)	(0.00255)
Medium	0.1550***	0.6790***	0.0414***	0.4030***	0.1290***	0.9230***	0.0324***	0.5490***
	(0.0293)	(0.161)	(0.00816)	(0.0872)	(0.0378)	(0.287)	(0.0108)	(0.169)
Large	0.3460***	1.2850***	0.1940***	1.1730***	0.2920***	1.5010***	0.1590***	1.3030***
	(0.0317)	(0.166)	(0.0135)	(0.0957)	(0.0418)	(0.285)	(0.0208)	(0.168)
Agglomeration	0.00049**	0.00167**	0.00024***	0.0014***	0.001009*	0.00421**	0.00036*	0.00303*
	(0.000248)	(0.000796)	(8.94e-05)	(0.000467)	(0.000535)	(0.00211)	(0.000210)	(0.00183)
	Exporter		Non-exporter		Exporter		Non-exporter	

	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit	2 SLS	IV Probit
Variables	(1)		(2)		(3)		(4)	
Constant	0.1040**		0.0230		0.0048		-0.0012	
	(0.0483)		(0.0166)		(0.0708)		(0.0274)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald (chi2)	174.47	123.02	386.86	358.53	5344.90	62.81	82.64	114.13
Weak instruments stat.								
Partial R^2	0.094		0.082		0.113		0.200	
Shea partial R^2	0.094		0.082		0.113		0.200	
Partial F	97.54		246.23		28.57		18.52	
Cragg-Donald statistic	84.42		216.18		72.06		358.92	
Critical value (10%)	19.93		19.93		16.38		16.38	
Observations	1,653	1,653	4,860	4,860	589	588	1,462	1,462
Financial Infrastructure								
Physical infrastructure								
Customs clearance			-0.00073	0.05130[a]		0.00165		-0.08090***
			(0.00177)	(0.0377)		(0.00252)		(0.0114)
Firm age			-0.00105**	-0.00348**		-0.00027		-0.00117
			(0.000517)	(0.00155)		(0.000776)		(0.00162)

Medium	0.13100***	0.48300**	0.07550*	0.07120
	(0.0267)	(0.239)	(0.0408)	(0.176)
Large	0.28400***	0.86400**	0.20800***	0.16800
	(0.0266)	(0.383)	(0.0438)	(0.269)
Agglomeration	9.87e-05	0.000639	0.00155***	0.00218
	(0.000269)	(0.000777)	(0.000405)	(0.00164)
Constant	0.15100***		-0.03070	
	(0.0463)		(0.0678)	
Country FE	Yes	Yes	Yes	Yes
Wald (chi2)	151.47	191.67	206.97	182.38
Weak instruments stat.				
Partial R^2	0.210		0.198	
Shea partial R^2	0.210		0.198	
Partial F	69.65		22.15	
Cragg-Donald statistic	211.67		80.76	
Critical value (10%)	19.93		19.93	
Observations	1,634	1,634	675	670

Notes: Robust standard errors appear in parentheses. Significance at: *** p<0.01, ** p<0.05, * p<0.1.
The reference for size dummies is that small refers to less than 20 employees.
[a]Statistically significant at 17%. Coefficients reported for the probit regression are marginal effects.
The results for the first stage regressions (not reported for convenience) are available upon request.

We replicated the regression in column (6), but calculated the probability of a firm being FDI by using Chile's number of days to clear customs as the average value and keeping the sample mean of the other variables. We did this to check if other countries in the sample reach Chile's level and to determine how it affects FDI.

As FDI is a dummy variable, the coefficients will indicate any change in the likelihood of FDI when its value changes from 0 to 1. This variable makes it easier to determine the economic magnitude of the effects. The estimate indicates an increase of 13.59 percentage points in the probability of a random firm being FDI when the mean of the amount of time it takes for the customs clearance process is reduced by 3 days. For Brazil, for instance, the average length of time it takes to clear customs could be greatly reduced to reach Chile's level. Finally, we noted that large and export firms are less affected by all three investment climate proxies that are explored in Table 3.

This article, however, has limitations mainly due to time constraints. We expect that future studies will have a new wave of enterprise surveys from the World Bank in which it would be possible to obtain a panel data set. With the panel, we could analyze the same firm over time; this dynamic will allow getting new insights.

CONCLUSIONS

This paper used firm-level data from the manufacturing and service sectors in Latin American countries to analyze how investment climate constraints affect the attractiveness of developing countries for FDI. Using a large firm data set, we conducted the first empirical study of eighteen Latin American countries to examine whether the investment climate matters for attracting FDI. Following the previous literature, we considered physical and financial infrastructure problems and customs clearance to measure investment climate constraints. In addition, we controlled for the age and size of firms and the agglomeration effect.

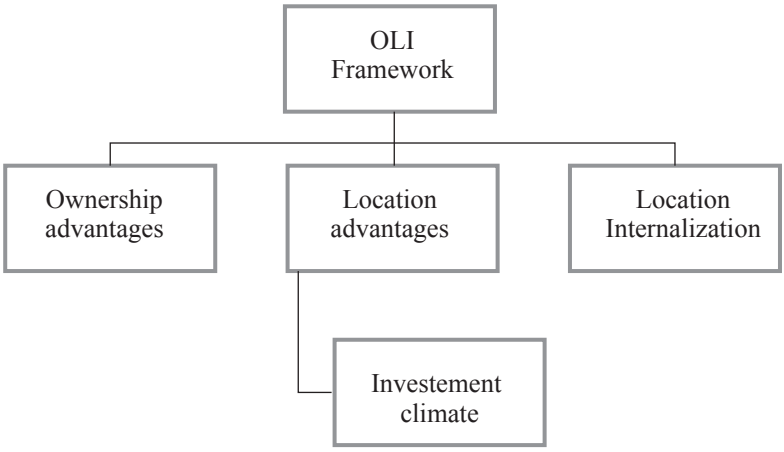
We found that a country with a sound investment climate, such as a small amount of time to clear customs and good financial services, might attract foreign investment. In addition, other control variables regarding firm characteristics are important, and the agglomeration variable shows that there are positive spillover effects. These results are consistent with the recent literature on investment climate and international integration. Splitting the sample into export and non-export

firms reveals that foreign firms that supply the global market are more affected by financial services than non-export ones. However, customs clearance has more effects on non-export foreign firms. Those that are either large or exporters are less sensitive to the three proxies used for investment climate. Thus, this paper contributes to the literature by collecting data from a large number of firms that operate in Latin America to show how the local environment of doing business can affect the attraction of foreign investment.

The evidence we presented has significant policy implications for developing countries. When optimal policies are formulated to attract foreign investment, developing countries such as those in Latin America should closely consider their financial infrastructure and trade regulations (customs clearance) as well. Regarding the low levels of public spending in less developed countries and the need to implement focused economic policy, optimal public policies are important for ensuring long-term growth.

APPENDIX

Figure A1. OLI framework extended with investment climate



Source: Authors' elaboration based on Dunning (1980).

Table A1. List of variables

Variable	Definitions
FDI	Dummy that takes value 1 if at least 10% of the firm capital is foreign
Age	Age of the firm
Size	Three categories based on permanent and temporary employees
Agglomeration	Number of foreign firms in the same sector and region
Financial infrastructure (pca)	i) Loans from banks; ii) loans from non-bank financial institutions (including microfinance institutions, credit cooperatives, credit unions, or finance companies); or iii) loans from a private or state commercial bank (% of investment financed)
Physical infrastructure (pca)	i) Number of power outages experienced in a typical month of the last fiscal year; ii) days to obtain a telephone connection; or iii) days of inventory of the most important input
Customs clearance (export)	Average number of days to clear customs (exports)
Export	Dummy that takes value 1 if the firm exports a share of its sales
Audited	Financial statements were reviewed and certified by an external auditor in the last fiscal year

Source: Authors' elaboration based on the investment climate survey conducted by the World Bank (2015).

REFERENCES

Alfaro, L.; Chanda, A.; Kalemli-Ozcan, S. ,& Sayek, S. (2004) FDI and Economic Growth: the role of local financial markets. *Journal of International Economics*, *64*(1), 89-112.

Alvarado, R., Iñiguez, M., ,& Ponce, P. (2017). Foreign direct investment and economic growth in Latin America, *Economic Analysis and Policy*, 56, 176-187. Retrieved from https://doi.org/10.1016/j.eap.2017.09.006

Amal, M. ,& Seabra, F. (2007). Determinantes do investimento direto externo (IDE) na América Latina: uma perspectiva institucional. *Economia, 8*(2), 231-247.

Anderson, J. ,& Gonzalez, A. (2013). Does Doing Business matter for foreign direct investment. *Doing Business*, 47-50.

Arbeláez, H. ,& Ruiz, I. (2013), Macroeconomic antecedents to US investment in Latin America, *Journal of Business Researcher, 66*(3), 439-447.

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

Bernard, A. B. ,& Jensen, J. B. (2004). Why some firms export. *Review of economic and Statistics*, *86*(2), 561-569.

Biglaiser, G. ,& DeRouen, K. R. (2006). Economic reforms and inflows of foreign direct investment in Latin America. *Latin American Research Review*, *41*(1), 51-75.

Blanco, L. R. (2012). The spatial interdependence of FDI in Latin America. *World Development*, *40*(7), 1337-1351.

Buch, C.M., Kesternich, I., Lipponer, A. ,& Schnitzer, M. (2014). Financial constraints and foreign direct investment: firm-level evidence, *Review of World Economics*, *150* (2), 393-420.

Cameron, A.C. ,& Trivedi, P.K. (2005). *Microeconometrics: Methods and Applications*. Cambridge: Cambridge University Press.

Corcoran, A. ,& Gillanders, R. (2015). Foreign direct investment and the ease of doing business. *Review of World Economics*, *151*(1), 103-126.

Dollar, D.; Hallward-Driemeier, M.,& Mengistae, T. (2006). Investment climate and international integration. *World Development*, *34*(9), 1498-1516.

Dunning, J. H. (1980). Towards an eclectic theory of international production: some empirical tests. *Journal of international business studies*, *11*(1), 9-31.

Glass, A. (2008). Vertical versus horizontal FDI. In S.R. Ramkishen ,& A.R. Kenneth (Eds.). *Princeton Encyclopedia of the World Economy*. Princeton: Princeton University Press.

Hallward-Driemeier, M., Wallsten, S., & Xu, L. C. (2006). Ownership, investment climate and firm performance. *Economics of Transition*, *14*(4), 629-647.

Hamilton, L. C. (2009). *Statistics with Stata*. (7th ed.). Belmont: Duxbury Press.

Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American economic review*, *94*(3), 605-627.

Kinda, T. (2010). Investment climate and FDI in developing countries: firm-level evidence. *World development*, *38*(4), 498-513.

Kinda, T. (2013). Beyond natural resources: horizontal and vertical FDI diversification in Sub-Saharan Africa. *Applied Economics*, *45*(25), 3587-3598.

Manole, V. ,& Spatareanu, M. (2015). Investment climate, foreign networks and exporting–evidence from Africa. *International Review of Applied Economics*, *29*(3), 349-373.

Montero, A. P. (2008). Macroeconomic deeds, not reform words: The determinants of foreign direct investment in Latin America. *Latin American Research Review*, *43*(1), 55-83.

Ottaviano, G. ,& Martincus, C. V. (2011). SMEs in Argentina: who are the exporters? *Small Business Economics*, *37*(3), 341-361.

Ramalho, R.; Meza, J. R. ,&Yang, J. (2014) Obtaining finance in Latin America and the Caribbean. (Latin America and the Caribbean Series Note No. 5). Washington, DC: The World Bank Group. Retrieved from https://www.enterprisesurveys.org/content/dam/enterprisesurveys/documents/research/Obtaining-Finance-LAC-Note.pdf

Sekkat, K. ,& Veganzones□Varoudakis, M. A. (2007). Openness, investment climate, and FDI in developing countries. *Review of Development Economics*, *11*(4), 607-620.

Stock, J. H.,& Yogo, M. (2002), *Testing for weak instruments in linear IV regression*. (NBER, Working Paper No. 284).

Tuman, J. P. (2006). Regime type, rights, and foreign direct investment in Latin America: a brief comment. *Latin American research review*, *41*(2), 183-186.

Williams, K. (2015). Foreign direct investment in Latin America and the Caribbean: an empirical analysis. *Latin American journal of economics*, *52*(1), 57-77.

World Bank. (2015), *Enterprise Surveys*. Washington: The World Bank. Retrieved from https://www.enterprisesurveys.org/portal/index.aspx#/library?dataset=Enterprise%20Survey.

Yeaple, S.R. (2009). Firm heterogeneity and the structure of US multinational activity, *Journal of International Economics*, *78*(2), 206-215.