

Special Issue S8: "FDI Inflows in the Brazilian Economy"

Guest Editor: Dr. Arti Yadav, Department of Commerce, Ramanujan College, University of Delhi, India.

Foreign Direct Investment And Labor In Brazil: An Econometric Analysis In The State Of Sao Paulo

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Received: Apr 7, 2024; Accepted: Aug 30, 2024; Published: Sep 2, 2024

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CITATION: Almeida MC, de Carvalho ACG, Polloni-Silva E, *et al.*, 2024. Foreign Direct Investment And Labor In Brazil: An Econometric Analysis In The State Of São Paulo. *Management and Economics Research Journal*, 10(S8): 9900094. <https://doi.org/10.18639/MERJ.2024.9900094>

ABSTRACT

The ability of FDI to spur economic modernization in the recipient economy has been widely acknowledged in the literature. Brazil stands out as the region that receives the most foreign investment in Latin America. Studies on the effects of FDI in Brazil are still in the early stages, though. The impact of FDI on the local labor market and the average worker income in the host region is examined in this study. To achieve this, we used the first regional-level FDI database in the nation and specifically examined the effects of FDI in the area with the highest industrial concentration: the state of São Paulo. This is the first study to examine while considering FDI in the area, the relationship between employment and income at the municipal level in the state of São Paulo. The findings support the claim that the presence of multinational corporations raises the standard of employment, particularly in fields that demand skilled labor. A favorable environment for FDI can leverage the economic and social development of host regions and support the formulation of local policies. This also emphasizes FDI as a vehicle for increasing employment and valuing the workforce, adding to the body of existing literature and supplying information for forthcoming research on the topic.

KEYWORDS: Foreign Direct Investment; Remuneration; Labor; Sao Paulo.

ABBREVIATIONS

FDI: Foreign Direct Investment; MNEs: Multinational Enterprises; UNCTAD: United Nations Conference on Trade and Development; FGLS: Feasible Generalized Least Squares; LIML: Limited Information Maximum Likelihood; DK: Driscoll-Kraay;

1. INTRODUCTION

The concept of FDI emerged as an engine for rapid, low-cost development, as presented by Hymer *et al.* [1], who defined this concept as a consolidated investment in an entity or sector stemming from control by a foreign organization.

After the fall of the military regime in Brazil, large-scale FDI transfers to the country led to a notable shift in the economic landscape of the nation. Only Brazilian citizens or permanent residents were allowed to invest in the country during the years of authoritarian rule, which limited access for foreign businesses to the sizable Brazilian market. But as the economy began to open and a democratic government took power, Brazil adopted pro-foreign investment policies that allowed the inflow of foreign money into vital economic sectors like manufacturing, energy, financial services, and telecommunications. Due to foreign businesses looking for growth opportunities in an environment that was more welcoming and conducive to investment, FDI increased significantly [2].

In fact, the literature suggests that FDI acts as a catalyst for domestic companies' productivity and efficiency due to spillover effects [3, 4]. As a result, policymakers, particularly in emerging nations, create incentives to attract FDI [5]. In this study, we examine how MNEs allow FDI into the host region. MNEs, particularly those from developed nations, typically outperform domestic firms from emerging nations, like Brazil, in terms of management and technology. However, spillovers that result in the diffusion of technology, information, and managerial skills can pass this technological and managerial superiority to domestic companies, willingly or unwillingly, boosting their productivity and efficiency [6, 7].

In this regard, Kayalvizhi and Thenmozhi [8] show how government initiatives can draw in new investors and how the presence of foreign money can close the technological gap. Extending this idea to Latin America, Chile's government has implemented several FDI-attracting policy instruments over the past ten years to address local disadvantages in the nation's less developed regions and the weakness of its innovation system [9].

In addition, studies on FDI also show a demand for a more specialized workforce (e.g., higher levels of education) and specialization in research and development to boost productivity [10-12], which in turn contributes to participation in

more advanced segments of the value chain [13, 14]. Therefore, better pay and working conditions brought on by the influx of FDI are reflected in the emergence of specialized jobs that demand higher qualifications, linking them to better pay [6, 15]. Thus, it supports a striking social evolution because the presence of multinational corporations typically provides their employees with better opportunities for professional development, aiming to improve educational standards and lessen the lack of specialization in the regions that receive these foreign corporations [16, 17].

Considering these factors, Blomström and Kokko [18] and Doh [19] highlight the need for additional research, particularly in emerging economies, to understand the effects of FDI on recipient regions and their connection to the stimulation of human capital. In this context, it is crucial to examine these effects on the Brazilian economy since Brazil is the source of one of Latin America's largest investment flows and the region's largest movement of exports and imports, according to UNCTAD [20]. Therefore, the purpose of this study is to address a knowledge gap regarding the regional impacts of FDI on the standard of employment at the municipal level in Brazil, a sizable developing economy. To this end, the municipalities of the state of São Paulo, which make up the largest portion of the nation's economic indicators, were covered by the first Brazilian database on FDI [21].

The findings demonstrate that the presence of foreign capital benefits the host regions by increasing the demand for greater specialization, improving the quality of jobs, and enabling higher wages for the employees involved. The literature on foreign capital flows is supported by these findings, which, along with those from the studies by Cleeve *et al.* [22] and Wang *et al.* [23], reaffirm the necessity of understanding, managing, and fostering these transitions in emerging economies.

2. LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

2.1 KNOWLEDGE TRANSFER AND FDI IN BRAZIL

Brazil confronted a unique crossroads in the 1950s when it faced the possibility of an economic collapse in Europe due to the damage caused by the Second World War. The nation undertook several fiscal, tariff, and exchange rate measures that not only stimulated but also turbocharged industrial growth and the implementation of deep structural changes under the visionary leadership of Juscelino Kubitschek's government and its bold slogan "50 years in 5". The period of economic growth that followed was notably marked by the predominance of national capital, especially through the consolidation of state-owned companies, an approach that diverged from the global trend [24]. This was true despite the strong bilateral relations Brazil maintained with its allies. The flow of international negotiations, however, was critical in this setting as an engine of economic expansion [1].

On a global scale, the importance of public policies aimed at attracting FDI is emphasized in recent studies [8, 25-27]. The expansion of the beneficial effects of knowledge diffusion and increased productivity, which improve the competitiveness of regional businesses, is one of the factors cited [28]. In non-tradable sectors, where productive growth tends to slow down over time, this increased competitiveness not only attracts new investment but also results in favorable externalities [29].

In this way, encouraging foreign investment in conjunction with other public policies may help to advance advancements in salary, educational opportunities, health, and social development. This is a result of the expansion of the industrial potential, the improvement of the accounting environment, and the opening of employment opportunities [26, 30]

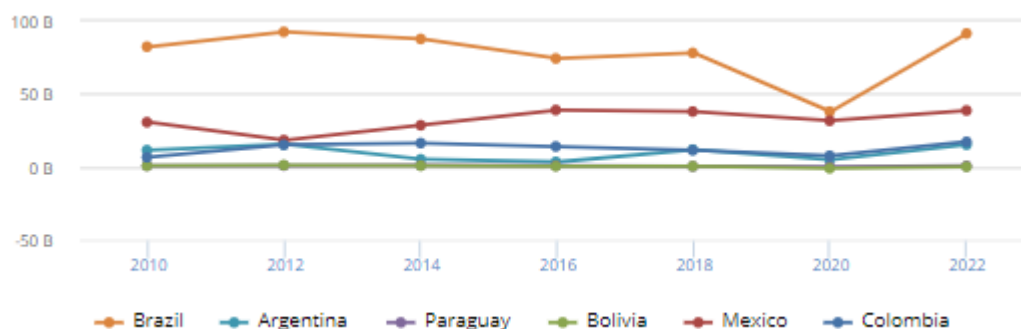
Currently, understanding and managing FDI is imperative to stimulate economic growth in regions such as Latin America. In 2018, the UNCTAD highlighted those countries such as Argentina, Chile, Peru, Colombia, Mexico, Venezuela, and Uruguay attracted substantial foreign capital flows in various sectors, such as gas production, manufacturing, the oil industry, mining, electricity and health, totaling around 150 billion dollars in Latin America and the Caribbean [20].

Nevertheless, the COVID-19 pandemic had negative repercussions on the global flow of foreign capital, especially in Brazil, where this drop has been accompanied by global uncertainty, leading foreign investors to seek less risky options. In addition, the economic downturn, domestic political instability, exchange rate volatility and fiscal austerity policies, along with the decrease in merger and acquisition activity, have contributed to the reduction in foreign investment [31].

In this context, the restoration of confidence in economic and political stability emerges as a key factor in the retraction of foreign capital, especially in Brazil, which has historically been receptive to foreign investment (see Figure 1). However, the incipient connection of national production chains with high-value global ones underscores the need for a more strategic approach. The absence of national research and the lack of adequate consideration of this alternative as a tool for economic policy and industrial modernization are challenges to be overcome.

To positively convert the impacts of FDI, it is crucial to align development policies with the attraction of high-productivity investments, promoting virtuous development processes that encompass inclusion, job quality, environmental sustainability, innovation, and technological complexity [31, 32].

Thus, through a proactive approach based on solid data, Brazil will be able to increase its international insertion, strengthen its commercial partnerships and attract investments that contribute to the sustainable growth of the national economy. More effective integration into global value chains will benefit multinational companies and the country's development, promoting job creation, technology transfer and greater competitiveness in the international market [6, 14].

Figure 1: FDI, net inflows (Balance of payments, current US\$).

Source: World Bank (2023).

2.2 FDI AND LABOR

Kim [7] emphasizes the significance of utilizing FDI and argues that MNCs typically possess technological and managerial advantages over domestic firms in developing countries, benefiting the latter through the transfer of knowledge.

Other studies emphasize the incentives for productivity and advantages resulting from the presence of knowledge and technology externalities from multinational corporations, highlighting the significance of this type of knowledge transfer and diffusion of foreign technologies. These externalities have the potential to boost professional services [33], encourage the ongoing development of each professional's methods and skills, and enhance production procedures [34].

The presence of MNCs encourages the sophistication of goods and products and results in the creation of skilled jobs, as demonstrated by Adam *et al.* [35]. As a result of this movement's increased competition, local businesses are compelled to offer comparable benefits to recruit qualified workers.

According to quantitative analysis, the inflow of foreign capital may increase the availability of jobs, frequently through strategic models like joint ventures between companies or investments in new businesses (also known as "greenfield") in areas without an existing organization [36, 37].

Additionally, because MNEs have higher productivity, FDI can raise wage levels. This frequently happens due to the access to highly skilled human resources, internal R&D structures, and other specialized services, which give businesses an ownership advantage [38, 39].

Greater productivity, better management, the availability of resources, and more complex management processes are characteristics inherent to multinational companies compared to domestic companies, which allows them to offer higher quality and higher wages in the receiving region [40]. In this context, we present the first hypothesis of this study:

H1: The presence of multinational companies boosts the quality (i.e., remuneration) of jobs in the host region.

MNEs strive for the best interaction between their activity and the local production chain because they are endowed with distinctive human and technological capabilities. They encourage technological diffusion, create a welcoming environment for investment, boost innovation capacity, and improve access to international markets [41]. In this way, the relationship formed between MNEs and the region host region will moderate the effectiveness of professional development.

Ly *et al.* [42] note that when there is enough capacity for the advanced technologies offered by businesses in the host economy, additional positive impacts will be made. Therefore, it is crucial that the area receiving the investment has minimally developed strategic geography, information flow, educational levels, and literacy rates from basic and/or higher education.

Additionally, the qualifications of employees and the economic characteristics of the market selected for the application of FDI become crucial elements in the specific creation of a group of specialized professional skills. However, depending on how well local education meets the needs of MNEs operating in a particular sector, local education can either encourage or discourage regional investment [14, 43].

However, the strength of this business and regional connection justifies interest in investment to ensure the provision of higher-quality jobs. Since higher education and educational indices are linked to high levels of other aspects of economic and human development, such as income, health, infrastructure, and sound economic policymaking, literacy indices demonstrate the variations in global investments in education [44, 45].

H2: The relationship between the presence of multinational companies and the leverage of job quality (i.e., remuneration) is moderated by the social, educational, and economic structure characteristics of the receiving region (i.e., regional heterogeneity).

To provide better quality jobs, contribute to economic growth, and become a diffuser of technologies, multinational companies associated with the flow of foreign investment are moderated by variables existing in the bilateral relationship with the recipient region.

Under this approach, moderated by a social character, well-being, health, security, and education are developments in human capital and the workforce that investors seek to guarantee better-quality jobs. The guarantee of basic services, health, infrastructure, and social security adds reliability and availability of resources to absorb foreign investment [26, 46].

Shatz *et al.* [45] add that the level of education in a host country should influence the level of FDI. In 1990, in at least 20 countries, only 1% or less of the population over the age of 25 had higher education. On the other hand, in eight countries, more than 20% of the population aged over 25 had some form of higher education, so this relationship explains why some countries receive little or no multinational investment.

Furthermore, the characterization of the economic structure of the receiving region must align with the market interests of the multinational company, as this will provide lower entry barriers for the exploitation of that new contingent. Following this trend, Kottaridi *et al.* [43] highlight the insufficiency of the traditional education system to prepare the workforce needed for local economic development, highlighting the need for professional technical education in this region. Finally, a workforce with better training in vocational courses can, in turn, create a more attractive investment environment where new technologies can be adopted more quickly and easily. The author also points out that investors will look for regions with basic infrastructure in the sector in which they intend to invest, making it easier to take advantage of knowledge and technology through the workforce.

3. METHOD(S)

3.1 CONSTRUCTION OF VARIABLES

This study employed a panel covering all of São Paulo's municipalities (645) from 2010 to 2016, totaling 4,515 observations. As a dependent variable, this study used average monthly income (*RMENSAL*) as a proxy to measure the quality of local jobs.

The main explanatory variable is the presence of MNEs (in each municipality according to their export volume, i.e., regional FDI intensity). Thus, local FDI intensity was calculated according to equation (01):

$$IED_{jt} = \sum_{i=1}^N W_{ijt} \left(\frac{M_{jt}}{N_{jt}} \right) \quad \text{Eq. (01)}$$

Where *M* is the number of exporting companies with a foreign origin in region *j* at time *t*, *N* is the number of total exporting companies (domestic and foreign), and *W* is the adjustment weight for each company *i* according to the value of its exports.

In fact, various local factors can influence average monthly income. Therefore, multiple control variables will be included, considering both economic factors (e.g., GDP per capita (*GDPPC*); percentage of GDP belonging to industry (*IND*); percentage of GDP belonging to services (*SERV*); percentage of GDP belonging to agribusiness (*AGRO*) and demographic factors (e.g., urbanization rate (*URBAN*); population density (*DENS*); the percentage of jobs for different educational levels (*SUPERIOR* and *FUNDAMENTAL*) will be included in the econometric models. The inclusion of these variables ensures that the 'net' effect of FDI is captured since the model already considers the demographic scenario and the economic structure of the region studied.

Furthermore, as the literature has shown, local government can have a significant influence on the functioning of organizations (in this case, MNEs) and their local effects. As suggested by some authors, the Firjan Fiscal Management Index (*IFGF*), from the Firjan System, will be incorporated as an essential element for analyzing the impact of FDI on local government [47, 48]. The variables employed, their description and their source are summarized in Table 1:

Table 1: Origin and description of variables.

Variable	Description	Source
RMENSAL	Average Monthly Income	DATA VIVA
IED	Foreign Direct Investment	FDI database
PIBPC	GDP per capita	IBGE
URBAN	Urbanization rate (%)	Calculated with SEADE data
DENS	Population density (population/km ²)	Calculated with IBGE data
IND	Percentage of GDP belonging to Industry	Calculated with IBGE data
AGRO	Percentage of GDP belonging to Agribusiness	Calculated with IBGE data
SERV	Percentage of GDP belonging to Services	Calculated with IBGE data
FUNDAMENTAL	Formal Employment of People with Complete Primary Education	SEADE
SUPERIOR	Formal Employment of People with Complete Higher Education	SEADE

Source: Authors, 2023.

3.2 MODEL FORMULATION AND ESTIMATION STRATEGY

We employed a predictive model to understand the influence of MNEs' presence on average monthly income, which, in this case, is a proxy for job quality. Therefore, equation 02 tests our first hypothesis.

$$(RMensal)_{jt} = \beta_0 + \beta_1 IED_{jt} + \beta_2' X_{jt} + \alpha_j + e_{jt} \quad (02)$$

Where *RMensal* is the average monthly income in municipality *j* at time *t*. The aim here is to capture localities whose economic structure demands a more qualified workforce and, therefore, better wages. Finally, β_0 is the intercept, β_1 and β_2 are the estimated coefficients, *X* is the matrix of control variables, α_j represents the time-invariant term for each municipality in the sample (i.e., fixed effects), and *e* is the residual.

Therefore, this work will try to meet all the econometric challenges of the model and will use estimation methods that guarantee consistent results. Thus, the candidate method for estimating the model presented in equation (02) is the fixed effects model (within) with standard error correction by the DK method since this model can deal with non-spherical disturbances (heteroscedasticity and autocorrelation between residuals), as well as not being limited by the size of the panel [49].

However, the main reason for using the DK fixed effects method is its ability to generate robust standard errors in relation to any form of cross-section (spatial) dependence, given that this study uses a sample of all the municipalities in São Paulo so that it is necessary to consider the neighborhood effect in the model.

The Hausman test will be carried out to confirm the choice of fixed effects. The data set will also be checked for non-spherical disturbances such as heteroscedasticity, autocorrelation and cross-section correlation using the modified Wald test [50] for heteroscedasticity, the Wooldridge *et al.* [51] test for autocorrelation and the Pesaran *et al.* [52] test for cross-section dependence.

Finally, there is a possible endogeneity between the presence of multinational companies and the dependent variable. In fact, foreign companies may choose to operate in a region precisely because of its local characteristics, such as the level of income.

In this context, this study employed a LIML instrumental variables model, as it performs better with small samples and weak instruments. It also tested endogeneity using the 'C-statistic' of the Sargan-Hansen test [53]. These steps aim to guarantee consistent econometric results.

Furthermore, this paper applied two robustness tests. The first was a sensitivity test, in which the 2.5% highest and lowest values of the FDI and Average Income variable were removed to check whether outliers were influencing the results. The second robustness test compared the results of the fixed effects model with the random effects estimate FGLS since fixed effects models can perform poorly on low variability between the entities in the panel [54].

4. RESULTS AND DISCUSSION

Firstly, a correlation matrix was drawn up, as shown in Table 4, to check the level of correlation between the variables and identify possible problems of multicollinearity in our models. However, no correlation coefficient higher than 70% was observed, thus indicating that the intervals of the standard errors of the estimators are not excessively high, which would tend to invalidate the hypothesis tests [55]. Knowing that the data sets have variables with different scales, the sample was subjected to a normalization process. Thus, according to the methods proposed by Borkin *et al.* [56] and Toropova *et al.* [57], it is possible to treat this set so that each variable has a common interval, and this treatment corroborates the interpretation of the parameters in the form of elasticity. Therefore, data processing consists of resizing the values in an interval of [0, 1] under the following equation (05).

$$x' = \frac{x - \min(x)}{\max(x) - \min(x)} \quad (05)$$

Where *x* is the primary value and *x'* corresponds to the normalized value.

Table 2: Correlation Matrix.

Variable	Average	Stand. deviation	<i>RMENSAL</i>	<i>IED</i>	<i>PIBPC</i>	<i>URBAN</i>	<i>DENS</i>	<i>IND</i>	<i>AGRO</i>	<i>SERV</i>	<i>FUNDAMENTAL</i>	<i>SUPERIOR</i>
<i>RMENSAL</i>	1606.71	454.77	1.00									
<i>IED</i>	16.23	73.99	0.34	1.00								
<i>PIBPC</i>	19.88	17.04	0.45	0.33	1.00							
<i>URBAN</i>	85.19	13.98	0.31	0.18	0.24	1.00						
<i>DENS</i>	317.00	1250.09	0.25	0.23	0.16	0.22	1.00					
<i>IND</i>	18.60	13.36	0.31	0.15	0.51	0.28	0.08	1.00				
<i>AGRO</i>	16.38	14.42	-0.39	-0.22	-0.29	-0.44	-0.26	-0.55	1.00			
<i>SERV</i>	38.11	11.37	0.22	0.13	0.02	0.41	0.20	-0.17	-0.60	1.00		
<i>FUNDAMENTAL</i>	0.17	0.06	0.16	0.06	-0.06	-0.04	0.01	-0.32	0.21	-0.08	1.00	
<i>SUPERIOR</i>	0.28	0.09	-0.40	-0.16	-0.08	-0.11	-0.16	0.04	0.22	-0.24	-0.40	1.00

Source: Authors, 2023.

Using data from the last year of FDI ATLAS [58], it is possible to geographically illustrate the information collected. Similarly to the literature, the presence of foreign capital and technology is related to better qualifications, a decrease in wage inequalities, and an increase in the income of skilled workers [30, 33], as shown in Figures 3 to 6.

Figure 3: Multinationals in the state of São Paulo.

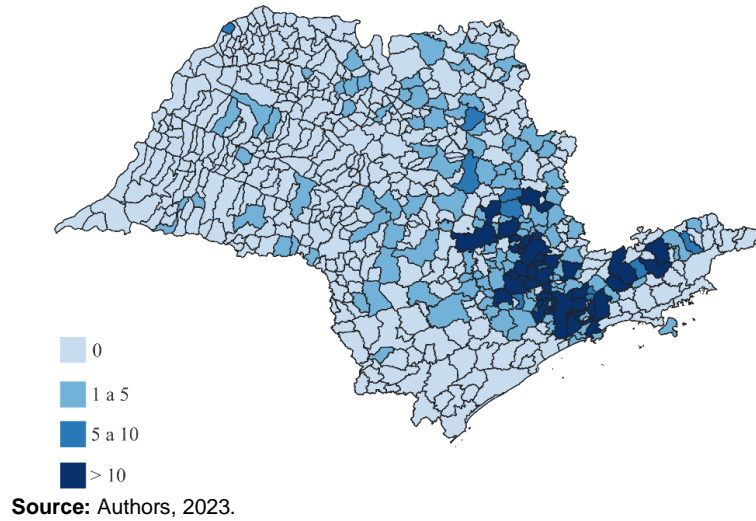


Figure 4: Distribution of FDI Intensity in the State of São Paulo (based on equation 01).

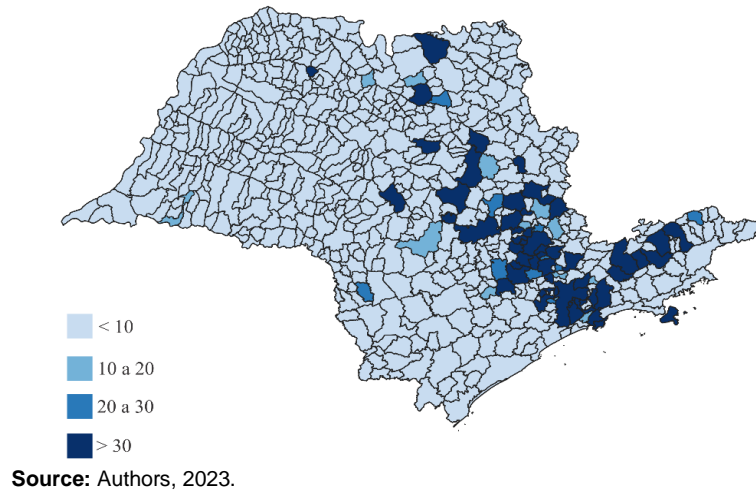


Figure 5: Distribution of GDP Per Capita in the State of São Paulo.

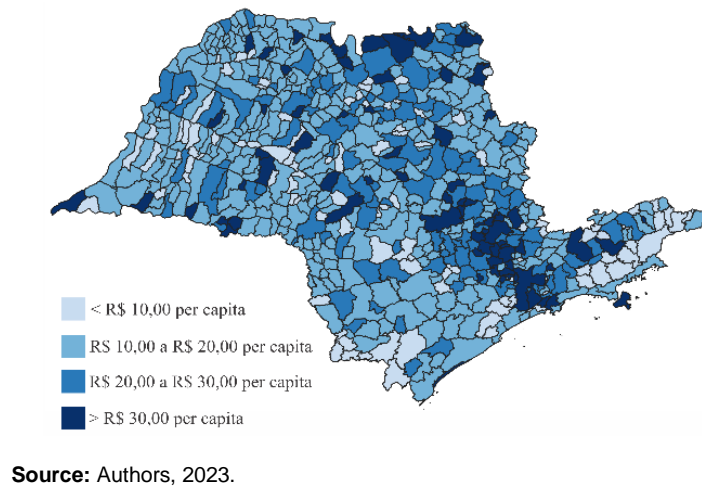
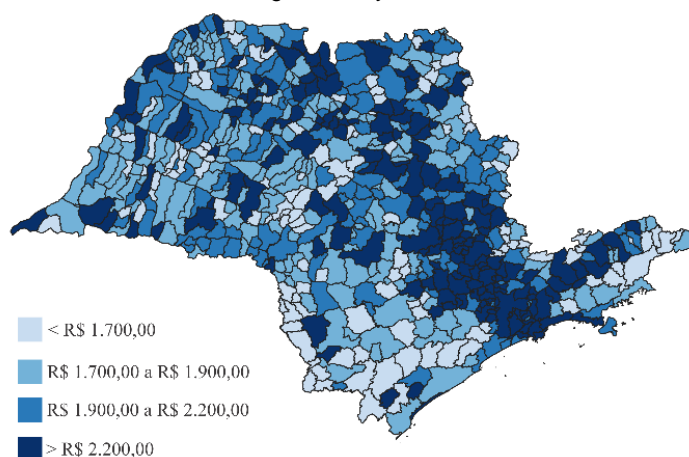


Figure 6: Distribution of Average Monthly Income in the State of São Paulo.

Source: Authors, 2023.

In this approach, the Hausman test was carried out in order to identify whether a fixed or random effects model is more appropriate for the situation, which indicated the use of the fixed effects model - DK (p -value = 0.0000).

In addition, the use of the FGLS method is explored in order to check the robustness of the results of the fixed-effects model [59], with the Wooldridge *et al.* [51] tests for autocorrelation and the Pesaran *et al.* [52] test for cross-section dependence as clarified in the proposed method.

Table 4 shows the main results of the linear model for fixed and random effects. The results show a positively significant relationship between the presence of FDI and the monthly remuneration value of São Paulo's municipalities. The tests carried out showed consistent results since all the control variables were statistically significant for the models used. Therefore, the results found in models 1 and 2 confirm the hypothesis that the presence of multinational companies boosts the quality of the jobs in the host region. This result confirms that found by Adam *et al.* [35] and Chen *et al.* [11], where the flow of foreign capital is able to stimulate and increase the generation of better-qualified jobs.

In addition, it is possible to ascertain that FDI significantly encourages specialization and complexity in productive environments due to the demand for better training, which consequently leads to better working conditions, as stated by Syeda and Abdul [60]. However, the positive relationship between the higher education of employees and the negative relationship for basic education is to be expected, as these factors have inverse behaviors. This type of positive effect, as explored by Kottaridi *et al.* [43], is justified by the demand for professional technical education in certain regions by MNEs, as well as being driven by access to complex production environments that stimulate the transfer of knowledge, culture and technologies [3, 4, 28].

Thus, the results indicate that the first hypothesis of this research (i.e., that there is a relationship between the presence of multinational companies and the leverage of job quality in São Paulo municipalities) is supported, given the positive and significant relationship between regional FDI and the average monthly income of the receiving region.

It is understandable that the use of variables that measure economic activities, such as FDI, can be subject to the problem of endogeneity. Therefore, in order to check whether the FDI variable is endogenous, we analyzed the C-statistic of the Sargan-Hansen endogeneity test (p -value = 0.1712) so that possible problems of statistical inconsistency arising from endogeneity were ruled out in our model. Subsequently, the variable FDI lagged by one year was tested in models 3 and 4 (FDI_{t-1}) to check the consistency of the results of models 1 and 2. It was found that the results for these models (3 and 4) remained similar to the previous models.

Finally, with regard to hypothesis 2, which states that the relationship between the presence of multinational companies and the leverage of the quality (i.e., remuneration) of jobs is moderated by the social, educational and economic structure characteristics of the receiving region (i.e., regional heterogeneity), the fixed-effects threshold regression model was initially used. However, this approach failed to optimize its objective function due to the possibly high number of zeros found in the sample for certain variables. In view of this, a more simplified approach was chosen to investigate the joint impact between the explanatory variable (FDI) and three different moderating spheres: social characteristics (PIBPC), education (SUP) and economic structure (IND).

To this end, three different variables were created: I) the first addresses the social sphere by moderating FDI intensity by gross domestic product per capita in the region (FDI \times GDP); II) the second seeks to capture the moderating effect of regional educational characteristics on FDI intensity (FDI \times SUP); III) and we constructed the third variable in order to verify the impact of the local economic configuration on FDI intensity (FDI \times IND). The results of the interaction of these variables in models 5, 6, 7, 8, 9 and 10 are shown in Table 4.

The results show that the social, educational and economic structure characteristics of the receiving region are able to moderate the intensity of FDI in the receiving regions and leverage the quality of jobs. Similar to the studies by Kottaridi *et al.*, Hu and Chiappini *et al.* [34, 43, 61], the data presented reinforces the need to understand and manage well-being, health, security, and education as human capital and workforce developments that investors seek in order to guarantee better quality jobs. Above all, guaranteeing basic services, health, infrastructure and social security adds reliability and availability of resources for absorbing foreign investment [46].

In order to check the robustness of the results, a sensitivity analysis was carried out to see if the results are subject to sampling outliers, as shown in Table 4. Specifically, following the methods proposed by Javorcik *et al.* [63] and Kannan [64], in which we removed the 2.5% highest and lowest values from the sample for the FDI variable, no sensitivity problems were found in the sample collected, since the results presented in Table 4 remain similar to those in Table 4.

5. CONCLUSIONS

This study adds to the literature on the regional effects of FDI inflows in Brazil. The use of a pioneering database on FDI at the municipal level in the country allows for an analysis of the effects of FDI in the municipalities of the state of São Paulo. Our results show that there is a positive and causal relationship between FDI intensity and average pay at the municipal level. In this way, they support the hypothesis that the presence of multinational companies boosts the quality of jobs in the host region.

Furthermore, the relationship between FDI and job quality can be moderated by social, educational and economic structure aspects of the receiving region due to the ability of these characteristics to explain the attractiveness of foreign capital in certain regions [65], the increase in remuneration and demand for skilled labor [33] and the need to promote solid public policies with a regulatory basis in the different life cycles of a company that are linked to the impact of both the incentives that companies face and their resources [44, 62].

The results show that the presence of foreign capital boosts service jobs that require skilled labor and professionals with higher levels of education (i.e., higher education). In addition, the data presented emphasizes the importance of understanding the dynamics of foreign investment, as it can play a crucial role in the country's sustainable economic development and socio-economic advancement. Continued encouragement of FDI, combined with efficient management, will make it possible to maximize the benefits for local communities and the economy as a whole.

Finally, although this study provides promising analyses on understanding the effects of FDI in the recipient region, the sample presented is restricted to São Paulo municipalities. As such, although it is an important region in the country, it is not possible to generalize the results found for all Brazilian scenarios. Hence, future studies could approach this analysis more comprehensively in order to see if the behavior is different in other regions of the country.

Table 3: Results of the proposed methods.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	FGLS	DK	FGLS.DEF	DK.DEF	FGLS	DK	FGLS	DK	FGLS	DK
<i>IED</i>	0.133*** (0.0212)	0.186*** (0.0323)	-	-	-	-	-	-	-	-
<i>IEDt-1</i>	-	-	0.178*** (0.0261)	0.216*** (0.0243)	-	-	-	-	-	-
<i>IEDxSUP</i>	-	-	-	-	0.754*** (0.106)	0.880*** (0.102)	-	-	-	-
<i>IEDxIND</i>	-	-	-	-	-	-	0,138*** (0,0518)	0,344*** (0,0708)	-	-
<i>IEDxPIBPC</i>	-	-	-	-	-	-	-	-	0.188 (0.120)	0.608* (0.253)
<i>PIBPC</i>	0.390*** (0.0277)	0.405*** (0.0440)	0.185*** (0.0304)	0.397*** (0.0462)	0.130*** (0.0282)	0.397*** (0.0434)	0.135*** (0.0294)	0.416*** (0.0435)	0.135*** (0.0308)	0.388*** (0.0532)
<i>URBAN</i>	0.0416*** (0.00583)	0.0367*** (0.00371)	0.0743*** (0.00907)	0.0398*** (0.00260)	0.0834*** (0.0102)	0.0378*** (0.00393)	0.0858*** (0.0102)	0.0371*** (0.00376)	0.0870*** (0.0102)	0.0392*** (0.00380)
<i>DENS</i>	0.0635*** (0.0180)	0.0695*** (0.0141)	0.103*** (0.0223)	0.0783*** (0.0136)	0.0988*** (0.0246)	0.0608*** (0.0136)	0.118*** (0.0253)	0.0768*** (0.0153)	0.122*** (0.0254)	0.0835*** (0.0166)
<i>IND</i>	0.0881*** (0.0143)	0.145** (0.0453)	0.168*** (0.0190)	0.148** (0.0459)	0.180*** (0.0182)	0.146** (0.0456)	0.181*** (0.0183)	0.139** (0.0466)	0.182*** (0.0185)	0.155** (0.0421)
<i>AGRO</i>	0.0268*** (0.00906)	-0.0219 (0.0297)	0.0959*** (0.0126)	-0.0256 (0.0297)	0.104*** (0.0118)	-0.0233 (0.0301)	0.105*** (0.0118)	-0.0237 (0.0301)	0.105*** (0.0119)	-0.0221 (0.0284)
<i>SERV</i>	0.148*** (0.0112)	0.0764* (0.0363)	0.225*** (0.0153)	0.0613 (0.0311)	0.251*** (0.0150)	0.0725* (0.0366)	0.255*** (0.0150)	0.0789* (0.0362)	0.255*** (0.0151)	0.0802* (0.0350)
<i>FUNDAMENTAL</i>	-0.205*** (0.00698)	-0.194*** (0.0386)	-0.223*** (0.00912)	-0.169*** (0.0330)	-0.215*** (0.00819)	-0.194*** (0.0383)	-0.215*** (0.00819)	-0.194*** (0.0389)	-0.216*** (0.00819)	-0.199*** (0.0381)
<i>SUPERIOR</i>	0.134*** (0.00964)	0.179*** (0.0239)	0.155*** (0.0115)	0.176*** (0.0177)	0.142*** (0.0108)	0.169*** (0.0234)	0.145*** (0.0108)	0.181*** (0.0244)	0.145*** (0.0108)	0.181*** (0.0250)
Constant	0.0423*** (0.0118)	0.0874** (0.0273)	-0.0273* (0.0161)	0.0966** (0.0240)	-0.0600*** (0.0158)	0.0908** (0.0277)	-0.0638*** (0.0159)	0.0881** (0.0277)	-0.0646*** (0.0159)	0.0832** (0.0260)
Hausman	3417.78***	-	1121.22***	-	3499.39***	-	3336.72***	-	3826.85***	-
Mod. Wald	1.6e+05***	-	1.7e+05***	-	1.6e+05***	-	1.5e+05***	-	1.5e+05***	-
Wooldridge	36.816***	-	28.774***	-	36.644***	-	36.807***	-	36.802***	-
Endogeneidade	1.872	-	-	-	0,027	-	0,489	-	0,023	-
Pesaran	323.581***	-	305.225***	-	322.503***	-	323.713***	-	322.211***	-
Observations	4,515	4,515	3,870	3,870	4,515	4,515	4,515	4,515	4,515	4,515
Number of municipalities	645		645		645		645		645	

Source: Authors, 2023.

Table 4: Sensitized results.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	FGLS	DK	FGLS.DEF	DK.DEF	FGLS	DK	FGLS	DK	FGLS	DK
<i>IED</i>	0.156*** (0.0117)	0.152*** (0.0351)	-	-	-	-	-	-	-	-
<i>IEDt-1</i>	-	-	0.138*** (0.00489)	0.184*** (0.0271)	-	-	-	-	-	-
<i>IEDxSUP</i>	-	-	-	-	0.629*** (0.105)	0.741*** (0.155)	-	-	-	-
<i>IEDxIND</i>	-	-	-	-	-	-	0.134*** (0.0480)	0.290** (0.0842)	-	-
<i>IEDxPIBPC</i>	-	-	-	-	-	-	-	-	0.189 (0.117)	0.536 (0.324)
<i>PIBPC</i>	0.249*** (0.0250)	0.290*** (0.0501)	0.121*** (0.0252)	0.273*** (0.0501)	0.0947*** (0.0266)	0.290*** (0.0499)	0.0977*** (0.0275)	0.292*** (0.0495)	0.0956*** (0.0287)	0.287*** (0.0436)
<i>URBAN</i>	0.0334*** (0.00587)	0.0247*** (0.00539)	0.0703*** (0.00954)	0.0268*** (0.00480)	0.0797*** (0.0107)	0.0253*** (0.00539)	0.0805*** (0.0106)	0.0249*** (0.00551)	0.0823*** (0.0107)	0.0268*** (0.00556)
<i>DENS</i>	0.0570*** (0.0145)	0.0592*** (0.0143)	0.0799*** (0.0209)	0.0684*** (0.0122)	0.0772*** (0.0247)	0.0556*** (0.0146)	0.0905*** (0.0248)	0.0637*** (0.0147)	0.0934*** (0.0250)	0.0672*** (0.0146)
<i>IND</i>	0.100*** (0.0141)	0.151*** (0.0394)	0.174*** (0.0182)	0.158** (0.0399)	0.180*** (0.0186)	0.151*** (0.0396)	0.181*** (0.0187)	0.149*** (0.0391)	0.182*** (0.0188)	0.154*** (0.0355)
<i>AGRO</i>	0.0333*** (0.00911)	-0.0110 (0.0278)	0.105*** (0.0122)	-0.0101 (0.0284)	0.109*** (0.0121)	-0.0121 (0.0282)	0.109*** (0.0121)	-0.0111 (0.0273)	0.109*** (0.0122)	-0.0130 (0.0267)
<i>SERV</i>	0.151*** (0.0113)	0.0870** (0.0299)	0.228*** (0.0147)	0.0768** (0.0265)	0.256*** (0.0155)	0.0848** (0.0307)	0.257*** (0.0155)	0.0889** (0.0288)	0.258*** (0.0156)	0.0875** (0.0279)
<i>FUNDAMENTAL</i>	-0.184*** (0.00677)	-0.153*** (0.0387)	-0.214*** (0.00940)	-0.124** (0.0325)	-0.216*** (0.00848)	-0.154*** (0.0386)	-0.216*** (0.00848)	-0.153*** (0.0389)	-0.216*** (0.00848)	-0.157*** (0.0382)
<i>SUPERIOR</i>	0.106*** (0.00924)	0.128*** (0.0140)	0.124*** (0.0112)	0.124*** (0.00896)	0.110*** (0.0107)	0.123*** (0.0152)	0.112*** (0.0107)	0.128*** (0.0136)	0.112*** (0.0107)	0.128*** (0.0137)
Constant	0.0458*** (0.0120)	0.0895*** (0.0181)	-0.0245 (0.0158)	0.0944*** (0.0177)	-0.0521*** (0.0165)	0.0917*** (0.0183)	-0.0533*** (0.0165)	0.0892*** (0.0180)	-0.0553*** (0.0165)	0.0892*** (0.0185)
Hausman	1803.94***	-	1508.29***	-	1803.76***	-	1799.97***	-	1778.50***	-
Mod. Wald	1.4e+05***	-	2.1e+05***	-	1.4e+05***	-	1.4e+05***	-	1.4e+05***	-
Wooldridge	326.782***	-	254.991***	-	326.180***	-	326.776***	-	326.722***	-
Endogeneidade	0.845	-	-	-	0.047	-	0.762	-	0.355	-
Pesaran	288.354***	-	281.799***	-	286.676***	-	286.665***	-	287.771***	-
Observations	4,285	4,289	3,644	3,645	4,285	4,289	4,285	4,289	4,285	4,289
Number of municipalities	640	644	639	640	640	644	640	644	640	640

Source: Authors, 2023.

CONFLICT OF INTEREST

None.

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