The Labor Market Effects of Multinational Entry [1]

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Abstract

This paper examines the labor market impact of a large multinational entry shock. In 1995, Brazil eliminated constitutional clauses that discriminated against foreign investors. Over the next decade, 700,000 workers joined multinational corporations (MNCs), doubling their workforce share. Using employer-employee data and exploiting sector-specific reform variation, I find that while workers switching to MNCs experience significant wage gains, the outcomes for domestic firm employees are heterogeneous: low-skill workers face lower wages and worsened employment prospects, while college graduates experience modest wage gains. To rationalize these findings, I develop and estimate a dynamic general equilibrium model with heterogeneous firms and workers, multinational production, labor market frictions, and informality. As MNCs enter following eased FDI restrictions, they increase the relative demand for college-educated workers, raising skilled wages while forcing less productive, low-skill-intensive domestic firms to exit. These findings highlight the complex distributional consequences of FDI attraction policies.

Keywords: Multinational corporations, labor market frictions, FDI, informality, .
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1. Introduction

Over the past three decades, global foreign direct investment (FDI) stocks have surged, rising from 10% of GDP in 1990 to almost 50% in 2020 (UNCTAD, 2024). During the same period, many developing countries dismantled the regulatory barriers to foreign investment that had been common in the 1980s and 1990s, with major liberalization episodes taking place in countries such as Mexico, China, India, and Korea (Feenstra and Hanson, 1997; Alviarez et al., 2022; Erten et al., 2023; OECD, 2024).[1] In addition to these reforms, governments also introduced proactive measures to entice multinational corporations (MNCs), setting up investment promotion agencies and implementing special tax regimes for foreign investors (Khandelwal and Teachout, 2016; Volpe and Sztajerowska, 2019). Spurred by these reforms, MNCs now occupy a central role in the global economy, accounting for about two-thirds of world trade and one-third of global GDP (Miroudot and Rigo, 2022).

Despite the prominence of policies aimed at attracting FDI and the growing influence of multinational corporations, evidence on the impact of FDI liberalization episodes remains scarce. The distributional effects of multinational firm entry remain particularly understudied. While prior research shows that multinational firms can boost local employment and raise wages (e.g., Setzler and Tintelnot, 2021; Alfaro-Ureña et al., 2021), they also compete directly with domestic companies in both output and input markets, potentially reducing job opportunities for workers in local firms.

This paper examines the labor market consequences of Brazil's 1995 FDI liberalization—a major policy shock that removed constitutional barriers discriminating against foreign investors. Using comprehensive administrative data and firm-level FDI inflow records, I estimate both the direct impact on workers employed in multinational affiliates and the indirect effects on other workers and domestic firms, leveraging the reform's sector-specific variation for identification. I focus on educational attainment as a key source of heterogeneity, showing that the policy's winners and losers are largely determined by education level.

I then construct a dynamic general equilibrium framework incorporating multinational entry, search frictions, and given Brazil's substantial informal sector, informality as an extensive margin of adjustment. The model captures how productive

[1] Over 85% of the approximately 2,500 FDI policy measures adopted between 1990 and 2019 were favorable to foreign investors (UNCTAD, 2023; Kobrin, 2005). Notable examples include Latin America in the 1980s and 1990s—Brazil, Mexico, Argentina, and Chile—several Asian countries in the late 1990s and early 2000s—China, Malaysia, India, Vietnam, and Korea—Eastern Europe in the 1990s (Hungary, Poland, the Czech Republic, and Slovakia), and North Africa and the Middle East in the last decade, such as Algeria and Saudi Arabia (OECD, 2024).

foreign firms with skill-biased technology create job ladders that disproportionately benefit college-educated workers. A multinational entry shock in the model thus displaces relatively less skill-intensive domestic competitors, forcing low-skilled workers toward informality.

Brazil's pre-1995 Constitution explicitly granted domestic firms "special protection," creating a two-tier system. Multinational firms faced higher taxation, restrictions on technology transfers and profit remittances, and limited access to public procurement, public loans, and subsidies. In addition, sector-specific regulations limited or barred foreign entry in industries such as finance, energy, mining, transportation, and professional services. As a result, Brazil's FDI stock -as a share of GDP- was actually lower in 1994 than it had been a decade earlier.[2] On August 16, 1995, a Constitutional Amendment removed the legal distinction between foreign and domestic firms, and over the following year most sector-specific entry restrictions were also lifted. By 2004, FDI stocks as a share of GDP had doubled, rising from 10% in 1994 to 20%.

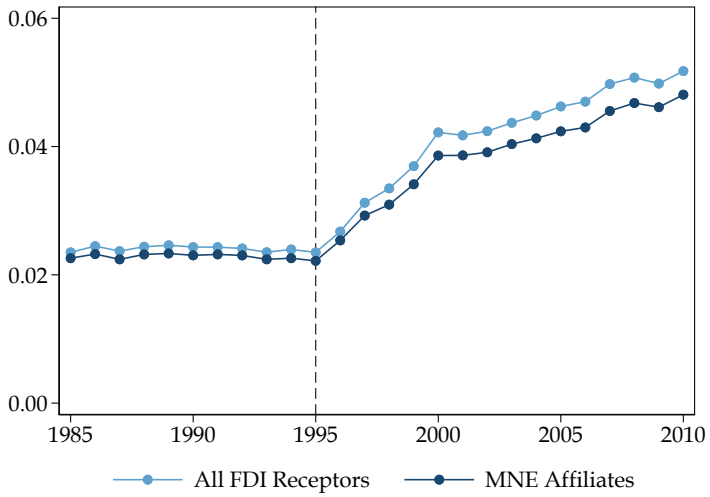
To document empirically the effect of this reform on labor market outcomes, I use two main data sources. First, I employ administrative employer–employee records covering the universe of formal employment in Brazil from 1985 to 2010. Second, I combine multiple firm-level datasets to identify foreign investors. In particular, I use FDI inflow records from the Registry of Foreign Capital of the Central Bank of Brazil spanning 1965 to 2010; along with databases on foreign affiliates of multinational corporations worldwide (Dun and Bradstreet's Worldbase and Refinitiv's M&A data). This information allows me to track all formal worker transitions between domestic and multinational firms over a period spanning 10 years before and 15 years after the liberalization.

Equipped with these data, I uncover several key patterns. The share of formal workers employed by multinational firms remained virtually unchanged at around 2.3% from 1985 to 1995, then nearly doubled in the following decade, reaching about 4.6% by 2005 (see Figure 1). This post-liberalization expansion was heavily concentrated in industries that had previously faced sector-specific restrictions. Moreover, because multinational firms disproportionately hire college-educated individuals -even after controlling for sector, location, and firm size— the majority of these new jobs accrued to higher-educated workers.

To estimate the labor market impact of the FDI liberalization, I employ a unified reduced-form analysis examining both (i) the direct effect on workers employed by multinational firms and (ii) the indirect effect of the large MNC entry shock on other workers and domestic firms, with particular emphasis on differences by education

[2]Specifically, it declined from 13% in 1985 to 10% in 1994 (UNCTAD, 2024).

Figure 1: Share of formal workers in multinational corporations in Brazil (1985-2010)



Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

level. The direct effect is identified via a switcher design, following workers as they move from domestic to multinational employers, with individual-level fixed effects to account for unobserved worker characteristics. The indirect effect exploits variation in the post-liberalization change in MNC employment shares across local markets, employing comprehensive fixed effects to net out broader sectoral and regional trends. Consequently, the estimation captures differences in MNC exposure resulting from the removal of pre-liberalization, sector-specific FDI restrictions within each region.

The reduced-form analysis yields three main findings. First, workers who switch to multinational corporations experience wage increases of approximately 20%, with the premia increasing with education level (*direct effect on MNC workers*). Second, the indirect effect on domestic firm workers varies sharply by skill: a 10 percentage-point increase in MNC employment share raises college graduates' wages by 1.4% but reduces wages for workers without high school by 0.7% and increases their probability of being laid off (*indirect effect on domestic firm workers*). Third, the same MNC expansion increases domestic firms' annual closure probability by 0.5–1.0 percentage points and reduces the employment of surviving domestic firms by approximately 1% (*indirect effect on domestic firms*). These findings reveal that the FDI liberalization operated as a skill-biased shock with substantial distributional consequences.

I then conduct several robustness checks and explore heterogeneity along multiple dimensions. The results are robust to alternative FDI exposure measures, different control groups for the switcher design, and focusing exclusively on industries with pre-liberalization sector-specific restrictions. The results are also robust to using broad

occupational categories as proxies of skill: the MNE entry shock increased wages for managerial and professional occupations but led to worsened labor outcomes for service and production workers. Finally, I find that the MNC wage premium is higher for occupations with high cognitive and social task content and for multinational firms with extensive global networks.

Motivated by these reduced-form findings, I develop a dynamic general equilibrium model to understand the mechanisms through which FDI liberalization generates such heterogeneous effects across workers. The model incorporates multinational production into a framework with frictional labor markets. It features heterogeneous firms with skill-biased production technologies, search and matching frictions that generate equilibrium wage dispersion, and an informal sector that provides an outside option for displaced workers.

I estimate the model via simulated method of moments, matching key features of the pre-liberalization Brazilian labor market including the firm size distribution, skill composition across firms, and informality rates by education level. When I simulate the observed reduction in foreign entry costs, the model quantitatively generates wage and employment effects consistent with the reduced-form estimates. The model predicts a 3.1% increase in the college wage premium and modest increases in informality among low-skilled workers.

The structural approach reveals how, as foreign entry costs fall and multinationals enter the domestic market, three distinct effects take place. First, a composition effect arises as new foreign entrants have higher average productivity than domestic incumbents and demand skilled labor more intensively under the skill-biased production technology. Second, a wage competition effect emerges through a job ladder mechanism: as productive multinationals enter at the top of the wage distribution, they pay higher wages to poach workers, generating both direct premia for multinational employees and indirect wage increases for skilled workers as competition bids up their wages in domestic firms. Third, competitive pressure in both output and input markets forces the least productive domestic firms to exit or downsize, reducing labor demand for unskilled workers, who are overrepresented in these firms. The adjustment for unskilled workers takes place through both lower relative wages and through displacement toward informality.

Related Literature. This paper directly contributes to the literature on the effect of multinational corporations on the local economy of their host countries. A large share of these studies have focused on the effect on local companies through buyer-supplier linkages (Aitken and Harrison, 1999; Javorcik, 2004; Alfaro et al., 2010 ; Harrison and Rodriguez-Clare, 2010; Keller, 2021 ; Alfaro-Ureña et al., 2022 ; Amiti et al., 2023 ;

Carballo et al., 2024), finding positive effects on backward linkages with multinational corporations. In terms of labor market outcomes, several studies find evidence of sizeable MNC wage premia using employer-employee data (Hijzen at al., 2013; Hjort et al., 2020; Alfaro-Ureña et al., 2021; Setzler and Tintelnot, 2021). A smaller literature has studied the effect of MNCs on workers in domestic firms. Until recently, most studies in this literature stream used aggregate data at the industry or regional level (e.g. Feenstra and Hanson, 1997). More recently, Alfaro-Ureña et al., (2021) used granular firm-to-firm data to explore the indirect effect on domestic workers through business-to-business linkages, finding a positive effect on workers employed by suppliers of MNCs. Finally, there is some evidence that domestic firms benefit from labor turnover of workers with MNC experience (Balsvik, 2011; Poole, 2013).

I contribute to this literature in three ways. First, I study the impact of a large, discrete, and well-identified shock to multinational entry. Second, I find evidence of the FDI liberalization as a skill-biased reallocation shock, with clearly identified distributional consequences. Third, I develop and estimate a structural model that reveals the mechanisms through which multinational entry generates these heterogeneous effects, showing how the interaction of skill-biased technology, labor market frictions, and competitive pressure creates winners and losers from the FDI liberalization.

This paper also contributes to the body of research on the broader consequences of globalization on labor markets. The effects of trade shocks on labor outcomes have been widely studied, both in general (e.g., among many others, Autor et al., 2013; Pierce and Schott, 2016; Coşar et al., 2016) and in the context of Brazil (Kovak, 2013; Dix-Carneiro 2014; Helpman et al., 2017; Dix Carneiro and Kovak, 2017, 2019; Felix, 2022; Dix-Carneiro et al., 2024). The effects of foreign investment liberalization episodes, however, has received much less attention.[3] A key distinction is that while trade liberalization episodes primarily affect firms through import competition and export opportunities, opening to foreign investment directly changes the composition of employers in the domestic market by facilitating the entry of foreign multinationals. This paper highlights the distinct labor market effects of this channel, which induce a reallocation of workers that disproportionately benefits educated workers in a similar manner to a within-sector skill-biased technology shock.

This paper also contributes to the subset of the aforementioned literature that specifically analyzes how globalization forces interact with frictional labor markets. Labor market frictions are key in developing countries: informal workers represent a large share of the labor force in many low and middle-income countries (e.g. 45% in

[3]Some notable exceptions are Alviarez et al., (2022) and Erten et al., (2023), which study the FDI liberalization in China. They focus on the effects in terms of structural transformation and demographic outcomes, rather than worker-level effects.

Brazil, 55% in Mexico, above 70% in Ghana and 80% in Rwanda; see Ulyssea, 2018; Cisneros-Acevedo, 2022; and ILO, 2025). Previous work has focused on the interaction of trade reforms and labor market frictions (Dix-Carneiro 2014; Helpman et al., 2017; Ruggieri, 2021; Dix-Carneiro et al., 2024), but there is practically no evidence on the impact of foreign investment under frictional labor markets. In this paper, I estimate, both through reduced-form estimates and through a structural model, that a large-scale multinational entry shock led to an increase in informality rates among unskilled workers.

Finally, this paper contributes to the relatively small but growing literature on policies aimed at attracting multinational corporations, such as the establishment of investment promotion agencies (Harding and Javorcik, 2011; Crescenzi et al., 2021; Carballo et al., 2023) and fiscal incentives for foreign investors (Egger et al,. 2010; Klemm and Van Parys, 2012; Khandelwal and Teachout, 2016). In particular, it provides evidence on the impact of a major reform that removed legal distinctions between foreign-owned and domestic firms and eased sector-specific entry barriers. Despite the proliferation of legislative measures to attract or repel foreign investors —-UNCTAD's FDI policy tracker documents more than 2,500 such policy changes between 1990 and 2020-— rigorous evidence on their economic effects remains limited. The findings in this paper indicate that policies promoting MNC entry deliver substantial benefits for some groups —particularly MNC employees and college-educated workers— while imposing significant costs on others, especially lower-skilled individuals.

This paper is structured as follows. Section 2 provides context on the FDI liberalization in Brazil, describes the data used and introduces some stylized facts. Section 3 provides reduced-form evidence on the effects of the liberalization. Section 4 contains the model of skill-biased multinational entry. Section 5 quantifies and estimates the model. Finally, Section 6 concludes.

2. The FDI Liberalization: Context, Data, and Stylized Facts

2.1. Legal Context and Background

This subsection describes the regulatory framework governing foreign investment in Brazil before and after the 1995 FDI liberalization. The 1988 Brazilian Constitution explicitly discriminated against foreign-owned companies, granting "special protection" to domestic firms. This constitutional foundation enabled two types of restrictive legislation: (i) discriminatory measures affecting all foreign investors, such as punitive taxes on profit remittances, public procurement preferences for domestic companies, and restricted access to public loans and subsidies; and (ii) sector-specific

constraints on foreign entry and operations. A series of constitutional amendments in 1995 revoked these discriminatory provisions, granting foreign and domestic firms equal legal status.

• *Discriminatory treatment of foreign investors before 1995.* The 1988 Brazilian Constitution explicitly differentiated between foreign and domestic companies, granting "special protection" to the latter. Article 171 of the Constitution specifically: (I) defined Brazilian companies of national capital (*Empresa brasileira de capital nacional*), (II) provided protection to these companies in activities deemed strategic or essential for the country's economic development, and (III) mandated preferential treatment for such companies in government procurement of goods and services (see Appendix B for the full text of the Article). Article 171 thus effectively acted as "umbrella" legislation, providing constitutional support and a foundation for further laws that differentiated between Brazilian companies of national capital and foreign investors (Sanchez de Souza, 2007). These distinctions can be categorized into two main types: general regulations that applied to all companies irrespective of their sector and sector-specific rules that limited the entry or operations of foreign investors in particular industries.

• *Pre-liberalization barriers affecting all sectors.* The constitutional endorsement of preferential treatment for nationally owned companies established the foundation for several barriers impacting foreign investors across **all sectors**. First, as specified in Article 171, Brazilian companies of national capital were granted preferential access to public procurement. Second, foreign investors faced punitive taxes on profit remittances. Dividends and interest paid abroad were frequently taxed at higher rates of 25%, compared to 15% for most domestic companies.[4] Third, Brazil imposed prohibitions or severe restrictions on the payment of royalties and the acquisition of technology from foreign parent companies, often arguing that such transactions constituted "disguised" profit remittances.[5] Finally, foreign investors had severely limited access to public loans and subsidies.[6] Together, these barriers imposed

[4]The term "punitive" refers to the more burdensome tax treatment imposed on cross-border profit remittances, primarily due to pre-1988 legislation that remained in effect and was further reinforced by the 1988 Constitution. Key statutes included Decreto-Lei nº 401/1968, which subjected interest paid abroad (and certain dividends) to withholding tax at a higher rate of 25%, and Lei nº 4.131/1962, which imposed additional controls and limits on remittances by foreign shareholders. Together, these measures increased both the fiscal and bureaucratic costs for foreign investors repatriating profits.

[5]For instance, Lei nº 5.772/1971 required the registration of all technology-transfer or licensing agreements with the *Instituto Nacional da Propriedade Industrial* (INPI). The INPI was empowered to deny contracts involving intra-group transfers that were deemed non-novel or unnecessary for domestic development. This authority was frequently employed for protectionist purposes under the constitutional framework of Article 171 (Barbosa, 2003; Guedes Furtado, 2012).

[6]The bylaws of the BNDES (*Banco Nacional do Desenvolvimento Econômico*), Brazil's largest public loan provider and the second-largest national development bank globally by assets, explicitly barred foreign investors from receiving public loans (BNDES, 2002). Similar restrictions were enforced by regional development agencies, such as the Superintendência do Desenvolvimento da Amazônia (SUDAM) and the

significant costs on foreign firms seeking to establish or operate in Brazil, effectively deterring foreign investment across all sectors.

• *Pre-liberalization barriers affecting specific sectors.* Beyond the broad restrictions affecting all foreign firms, **specific sectors** were explicitly barred or heavily restricted to foreign investors. Several of these prohibitions were enshrined in the Constitution, including explicit bans on foreign entry into several sectors: energy and mining (Article 176), transportation (Article 178), information and telecommunication technologies (Article 21), media (Articles 222), financial services and insurance (Article 192), oil and gas (Article 177), and professional services (Article 199). In addition, the concept of "Brazilian companies of national capital" established in Article 171 served as the basis for regular legislation to further limit foreign participation in other sectors. The two main examples are restrictions on foreign entry into computer science and automation (Lei 8.248 of 1991) and into construction and public infrastructure (Decreto-Lei 94.002 of 1987). Appendix Figure B1 provides a comprehensive overview of the legislation restricting foreign entry into specific sectors.

• *The FDI Liberalization.* The main milestone in the liberalization of foreign investment was the constitutional amendment of August 16, 1995, which revoked Article 171, thereby ending the legal distinction between foreign-owned and domestic firms (6th Constitutional Amendment). This amendment eliminated the concept ——and the associated preferential treatment—— of "Brazilian companies of national capital," thus placing foreign investors on equal legal footing with domestic firms.

The same day, several constitutional amendments dropped the sector-specific restrictions in energy and mining (6th Constitutional Amendment), professional services (6th Constitutional Amendment), transportation (7th Constitutional Amendment), and information and communication services (8th Constitutional Amendment). Later amendments in November 1995 and August 1996 opened up to foreign investors oil and gas (9th Constitutional Amendment) and financial services (13th Constitutional Amendment).[7] A few sectors continued to have significant restrictions, including media and air transportation (UNCTAD, 2005).[8] The variation arising from the removal of sector-specific regulatory constraints will be important to identify the effects of multinational entry on labor markets in Section 3.

Having dropped the "umbrella" legislation that differentiated between foreign and

Superintendência do Desenvolvimento do Nordeste (SUDENE). The Profit Remittances Law (Lei 4.131) required foreign-controlled firms to obtain "exceptional authorization" from the Ministry of Planning to access public funding. In practice, such authorizations were rare (De Lira, 2005).

[7] In the case of banking, the 13th constitutional amendment was preceded in November 1995 by an opening up by the executive power through the "Exposição de Motivos nº 311", a document which effectively allowed case-by-case basis entry of foreign banks (Ramos, 1998).

[8] Foreign firms could only own up to 20% of the shares of companies operating in air transportation and up to 30% of the shares of media companies.

domestic firms, the other restrictions affecting firms across all sectors were also dropped between 1995 and 1996.[9] Appendix Figure B1 maps in detail the constraining pre-liberalization laws with the corresponding liberalizing legislation.

2.2. *Data*

To analyze the impact of the FDI liberalization on labor markets, I use two main types of datasets: (i) administrative employer-employee records covering all formal employees in Brazil from 1985 to 2010, and (ii) a series of firm-level administrative and commercial datasets identifying foreign investors in Brazil.

• *Employer-employee data*. The primary dataset used to measure labor market outcomes is the RAIS (*Relação Anual de Informações Sociais*), an administrative dataset compiled by the Brazilian Ministry of Labor. This dataset encompasses the universe of formal employment spells in Brazil and covers the period from 1985 to 2010—spanning 25 years, including 10 years before and 15 years after the FDI liberalization.[10] For each employment spell, the dataset provides information on the employee, the employer, start and end dates, wage, occupation, type of contract, and hours worked. The employee data includes details such as educational attainment, age, gender, and nationality. Employer-level data is recorded at the establishment level, with each establishment linked to its parent firm. For each employer, the dataset provides information on the sector of activity, opening and closing dates, location (at the municipality level, with approximately 5,500 municipalities in Brazil), and legal nature of the firm. The cleaning procedure used to construct the employer-employee panel from the employment spell dataset follows the methodology in Dahis (2024) and Dix Carneiro and Kovak (2017). Employment status is fixed at the end of each calendar year, and for workers holding multiple jobs at year-end, only the highest-paying job is retained. The sector classification used in the analysis is the CNAE (*Classificação Nacional de Atividades Econômicas*), which is broadly aligned with the ISIC nomenclature.[11]

[9] Preferential access to public procurement to domestic firms was eliminated with the revocation of Article 171 in August 1995. The punitive tax on foreign investment was effectively dismantled by Lei nº 9.249 of December 1995, which eliminated the higher withholding rates on cross-border profit remittances, ensuring equal tax treatment for foreign and domestic investors. The constraint on intra-group royalties and technology acquisitions was lifted by the Industrial Property Law (Lei nº 9.279/1996), which liberalized technology licensing rules. Finally, the ending of the legal concept of "Brazilian companies of national capital" meant that access to public loans and subsidies by foreign investors was eased. For instance, the BNDES approved use of external funds by foreign investors through changes in its bylaws. In 1997 it further approved use of internal public funds on firms with foreign ownership operating in most sectors (BNDES, 2002; Decree 2.123).

[10] The government fines firms for non-compliance with these reporting requirements. In addition, workers need accurate RAIS records to claim unemployment benefits and federal wage supplements. Thus, both agents have incentives to report accurately (Bustos et al., 2020; Dix Carneiro and Kovak, 2017).

[11] Throughout the sample period (1985–2010), there was only one sector nomenclature change, transi-

• *Databases on foreign investors and multinational corporations in Brazil*. In order to identify foreign investors in Brazil, I use three main datasets.

First, I use the Registry of Foreign Capital (*Registros de Capitais Estrangeiros*, hereinafter the Registry) of the Central Bank of Brazil (*Banco Central do Brasil*, hereinafter BCB), which identifies all incoming foreign investment flows from 1965 to 2010. The information includes the date of investment, the fiscal name of the destination firm in Brazil, the name of the direct parent company abroad, and the country of origin of the direct parent company. All foreign investment flows must be registered by law. The legal basis is Lei 4.131 of September 1962, which established the Registry and makes registration mandatory within 30 days following the capital's entry into the country. Proof of registration is required for any capital or profit remittances. Furthermore, foreign investors that fail to register are subject to both civil and pecuniary sanctions (BCB, 1985). Using these data, I can identify all firms in Brazil that received foreign investment flows between 1965 and 2010.

Second, I complement the firm-level flow information with data on multinational firm affiliates in Brazil from Dun and Bradstreet's Worldbase (hereinafter, DnB). This database contains information on the affiliates of more than 400,000 multinational firm groups, including the name, opening date, country of origin, and sector of activity of the global ultimate parent company (GUP); as well as the name, opening date, country of operation, and sector of activity of the foreign affiliate. The data are at the establishment level. Some papers that have used this dataset include Alfaro and Chen (2012), Alfaro et al. (2016), and Carballo et al., (2023) . In Brazil, it has information on 9,731 multinational firm affiliates that altogether have 50,029 establishments in the country, belonging to 5,147 different global ultimate owners. These data are key to capture: (i) foreign firms that opened before 1965, (ii) affiliates that change ultimate ownership but not direct ownership, and (iii) firms that—despite its mandatory nature and the presence of significant fines—–failed to register in the Registry of Foreign Capital. In addition, while the Registry contains information on the origin (direct parent company) of the investment flow, it does not indicate the GUP. Using DnB allows me to identify the GUP, which will in turn be used to determine the country of origin and the number of affiliates worldwide of the multinational firm group.

Finally, I use data from Refinitiv's Mergers & Acquisition database.[12] It contains information on merger and acquisition deals globally, including the name, industry, and origin of both the acquirer and target companies, as well as the date the deal was

tioning from CNAE 1 to CNAE 2 (comparable to the shift from ISIC Rev. 3.1 to ISIC Rev. 4). Official concordance tables published by the IBGE (*Instituto Brasileiro de Geografia e Estatística*) were used to match sector nomenclatures.

[12]Note that Refinitiv was acquired by LSEG Data & Analytics in 2021.

completed. For Brazil, it provides information on 2,805 M&A transactions between 1985 and 2010. These data helps in identifying the mode of entry of multinational firms in Brazil, distinguishing mergers and acquisitions from greenfield investment. In addition, it helps identify multinational firm groups that expand in Brazil through domestic mergers and acquisitions.[13]

• *Merging of main databases*. The databases on foreign investors and multinational companies in Brazil use company names as firm identifiers. To be able to merge this information with the employer-employee data, I match the legal company names for the foreign investment recipients with the corresponding Brazilian tax identifier (the CNPJ number —*Cadastro Nacional da Pessoa Jurídica*). For that purpose, I use a state-of-the-art fuzzy matching algorithm from the Non-Metric Space Python Library (NSMLIB) and a database of the universe of legal names of all firms in Brazil.[14] For 86.6% of cases, the match is practically perfect, with similarity scores above 0.99. For all remaining cases, I carry out a manual clerical review of the top suggested matches. The end result is a match rate of 94.4% of all FDI flow records.

A firm will be considered an FDI receptor from the first time it receives a foreign investment flow (according to either of the three datasets). For example, a firm established in 1986 that received its first foreign investment inflow in 1996 will be considered domestic from 1986-1995 and foreign from 1996 onwards. If a firm directly opens with foreign ownership, it will be considered as such from the beginning.

In addition, I match the direct parent company (i.e., the foreign direct investment flow emitter) with its global ultimate parent company (GUP). For this purpose, I use data from Dun & Bradstreet, which identifies the GUP for over 400,000 multinational firm groups encompassing more than 2 million affiliates worldwide. I follow the same fuzzy matching procedure described earlier. Firms with an identified GUP are thus classified as "Multinational firm affiliates". Throughout the paper, I conduct baseline analyses for both "All FDI recipients" and the subcategory of "Multinational firm affiliates".[15]

• *Data on Informality.* Since the RAIS administrative data only captures the formal sector, a complete analysis of labor market adjustments requires measuring shifts into and out of informal employment. To measure informality rates and labor market adjustments outside formal employment, I use the Brazilian Demographic Census for

[13]For instance, a global ultimate parent company with an affiliate in Brazil may acquire a third company in the country, issuing debt through its first affiliate. Since there is no cross-border flow involved, such an expansion would not be captured by the Registry of Foreign Capital of the BCB.

[14]This list is obtained from combining (i) the universe of firm names in all RAIS records between 1985 and 2010 and (ii) the universe of registration records of all firms in Brazil from the CNPJ.

[15]FDI recipients with an identified GUP (referred to as "Multinational firm affiliates") represent 93.5% of all workers in FDI recipients but only 20.3% of total FDI flows.

1991, 2000, and 2010. Workers are classified as formal if they report having a signed work card (*carteira assinada*), the legal requirement for inclusion in RAIS. This allows calculation of skill-specific informality rates across microregions and measurement of how regional exposure to MNC entry affects informal employment. While these repeated cross-sections do not track individual workers, they capture the full employment distribution, including informal workers and those outside the labor force who are unobserved in administrative data.

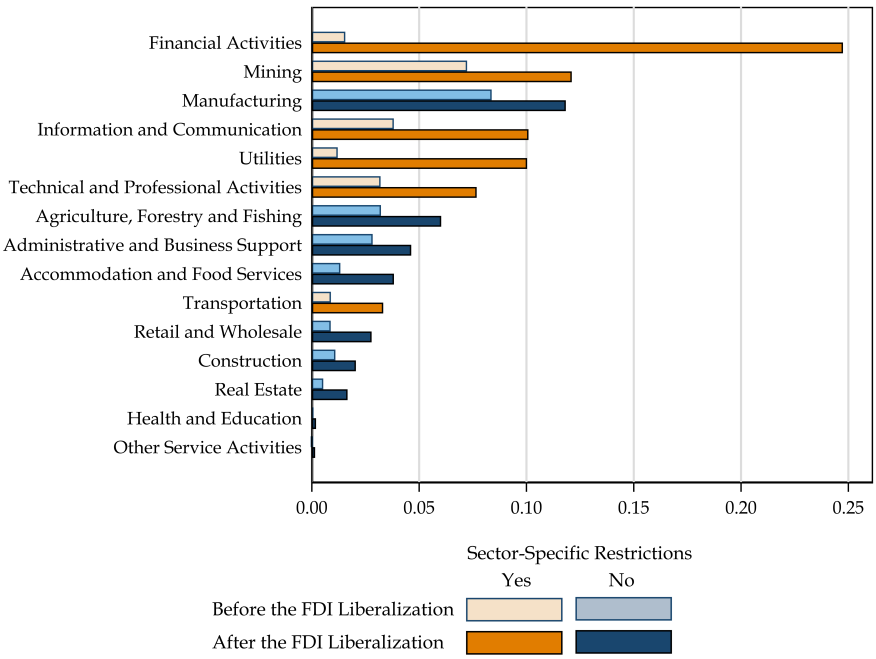
2.3. ***Descriptive Statistics***

• *The FDI liberalization*. Between 1985 and 1995, the share of formal workers in multinational firm affiliates remained stagnant at 2.3%. In the decade following the Constitutional Amendment that removed the legal distinction between domestic and foreign companies, the share nearly doubled, reaching 4.6% by 2005 and 5.2% by 2010 (see Figure 1). In absolute terms, the number of workers in multinational firms hovered around half a million between 1985 and 1995, rose to 1.2 million by 2005, and reached 1.8 million by 2010. In other words, one decade after the FDI liberalization, an additional 700,000 more individuals were employed in multinational firms. As shown in Appendix Figure C1 , similar increases can be observed in the share of the total wage bill of multinational companies (4.7% in 1995 to 9.5% in 2005) and in the share of new hires (1.6% in 1995 to 3.2% in 2005).[16] Practically all of the expansion in MNC employment shares took place in new establishments (Appendix Figure C2-a), with no evidence of expansion in pre-existing establishments. Approximately half of the increase took place in new establishments owned by multinational groups that were already present in Brazil, with the remaining half taking place through global ultimate parent firms that had never previously been present in Brazil (Appendix Figure C2-b).

• *By sector and region*. As outlined in Section 2.1, there were two types of measures introduced during the FDI liberalization: general measures applicable across all sectors and specific measures that removed entry restrictions in certain industries. Between 1995 and 2005, the share of workers employed by multinational firms increased in all aggregate sectors. However, the growth was significantly more pronounced in industries that experienced the removal of sector-specific restrictions (e.g. finance, utilities, information and communication, professional activities), where the share rose on average by 8.3 percentage points, compared to a modest average increase of 1.6 percentage points across other industries (see Figure 2).

[16] These two figures hint at two features of workers in multinational companies that will be subsequently assessed: (i) higher wages and (ii) more job stability.

Figure 2: Share of formal workers in multinational corporations in Brazil
By aggregate sector and presence of sector-specific restrictions



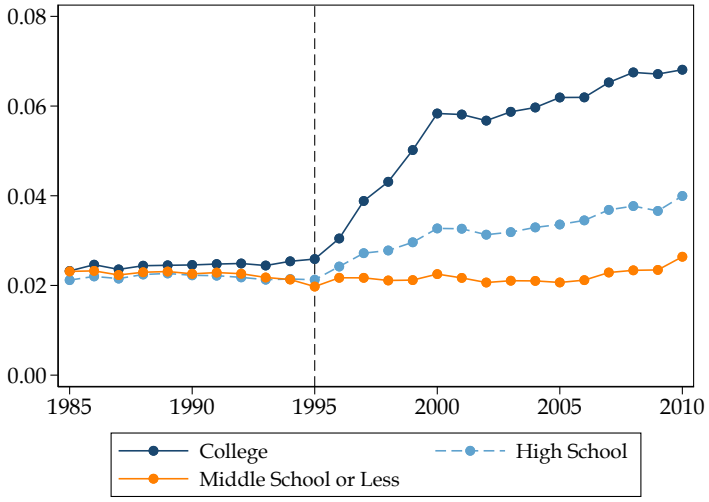
Before the FDI liberalization refers to 1994, after the liberalization refers to 2005.
Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Building on prior studies (e.g., Kovak, 2013; Dix-Carneiro and Kovak, 2017), this paper employs "microregions" as the unit of analysis for local labor markets in Brazil, with 494 consistent microregions identified over time.[17] Following the FDI liberalization, 85% of local labor markets saw an increase in the share of workers employed by multinational companies. However, the extent of this increase varied significantly across microregions, even within the same states (see Appendix Figures C3 and C4) . State fixed effects account for only 8.2% of the total variation in the change in multinational employment shares from 1994 to 2005.

• *By worker educational attainment*. Next, I examine how the share of workers in multinational firms varies by education level. As shown in Figure 3, the largest increase occurred among college-educated individuals, where the share rose by 3.6 percentage points (from 2.6% to 6.2%). For those with a completed high school education, the increase was more modest—1.2 percentage points (from 2.1% to 3.3%). Meanwhile, the share of workers in multinational firms without a high school diploma remained virtually unchanged, rising by just 0.1 percentage point (from 1.9% to 2.0%).

[17]The methodology for generating consistent areas over time follows Kovak (2013).

Figure 3: Share of formal workers in multinational corporations in Brazil (1985-2010)
By educational attainment level



Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

These differences by educational attainment could, ex ante, result from either a compositional effect (e.g., multinational firms being more likely to establish affiliates in different sectors before and after liberalization) or differences in the share of college- and high school-educated workers hired by these firms. To formally explore this, I estimate the following equation:

$$Z_{f(sr),t} = \alpha \, \mathbb{I}(\text{MNE}_{f,t}) \; + \; \beta X_{f(sr),t} \; + \omega_{sr,t} \; + \; \varepsilon_{f(sr),t} \tag{1}$$

where $Z_{f(sr),t}$ refers to the share of workers in firm f operating in sector s in microregion r at time t with completed college or high school. The binary variable $\mathbb{I}(\text{MNE}_{f,t})$ equals one if firm f is a multinational affiliate. $X_{f(sr),t}$ controls for firm size by adding total employment (in logs) as a covariate, while $\omega_{sr,t}$ controls for the sectoral and regional structure through sector-region-time fixed effects. This equation is estimated separately for the years 1994 (before the FDI liberalization) and 2005 (after the FDI liberalization). The results are presented in Table 1.

Overall, even after controlling for sector-region composition and firm size, multinational companies employ a significantly higher share of college- (15–23 percentage points higher) and high school-educated workers (16–18 percentage points higher). This pattern holds both before and after the FDI liberalization and is particularly pronounced for college-educated workers in the post-liberalization period.

The descriptive statistics reveal several stylized facts. First, the share of workers in multinational firms rose sharply following the FDI liberalization. Second, the rise was

Table 1: Skill Composition of Employment in Multinational Firms Before and After the FDI Liberalization

$Z_{f(sr),t}$:	% Completed College		% Completed High School	
	1994	2005	1994	2005
	(1)	(2)	(3)	(4)
$MNC_{f,t}$	0.153***	0.233***	0.177***	0.169***
	(0.004)	(0.003)	(0.010)	(0.006)
Sector-Region F.E.	Yes	Yes	Yes	Yes
Controls:	$L_{f,t}$	$L_{f,t}$	$L_{f,t}$	$L_{f,t}$
Observations	128,715	225,185	128,715	225,185

This table shows the results from estimating Equation (1) separately for 1994 (before the FDI liberalization) and 2005 (after the FDI liberalization). Sample: panel of all firms with more than 10 employees. Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

particularly pronounced in industries with pre-existing sectoral restrictions. Finally, this increase was concentrated among college-educated workers, reflecting the tendency of multinational firms to hire more skilled workers even after accounting for firm size and sector-region composition. These stylized facts guide the identification strategy in Section 3, which leverages sectoral variation to estimate the indirect impact of MNC entry on domestic firms and workers, and the modeling approach in Section 4, which incorporates a framework where MNCs disproportionately hire skilled workers.

3. The Impact of the FDI Liberalization: Reduced-Form Evidence

3.1. Empirical Strategy and Identification

• *Baseline Specification*. This section outlines the baseline empirical strategy used to examine the effects of the FDI liberalization on job market outcomes. The objective is to assess both (i) the direct impact on individuals employed by multinational corporations and (ii) the indirect impact on workers in domestic firms. For that purpose, I estimate the following empirical model:

$$y_{i,f(jr),t} = \alpha\, \mathbb{I}(\text{MNC})_{i,f(jr),t} + \beta\, \mathbb{I}(1-\text{MNC})_{i,f(jr),t} \times \text{FDI Shock}_{f(jr),t} + \phi_i + \omega_{\text{jr}} + \omega_{\text{j,t}} + \omega_{\text{r,t}} + \varepsilon_{i,f(jr),t} \quad (2)$$

$y_{i,f(jr),t}$ denotes a job-market outcome for individual i employed by firm f which operates in sector j and microregion r in year t. In most specifications, the job market

outcome is one of the following: (i) the mean monthly wage of worker i in firm f [18], (ii) a binary variable that takes value one if individual i is hired by firm f at time t, or (iii) a binary variable that takes value one if individual i is laid off by firm f at time t.

$\mathbb{I}(\text{MNC})_{i,f(jr),t}$ is a binary variable that takes the value one if firm f, which employs worker i, is a multinational corporation. Consequently, α is the main parameter of interest to identify the **direct effect** for workers employed in multinational firm affiliates. $1 - \mathbb{I}(\text{MNC})_{i,f(jr),t}$ thus takes value one if firm f, which employs worker i, is a domestic firm. This variable is interacted with FDI Shock$_{f(jr),t}$, a variable that proxies the individual exposure to the FDI liberalization through the post-liberalization change in the share of workers in multinational firm affiliates in the sector j and region r where worker i is employed. More formally, it is defined as FDI Shock$_{f(jr),t} = s_{f' \neq f,jr,t} - s_{f' \neq f,jr,1994}$, where $s_{f' \neq f,jr,t}$ represents the share of workers in multinational firms affiliates in sector j and microregion r excluding firm f, and $s_{f' \neq f,jr,1994}$ is the corresponding share in the last pre-liberalization year.[19] The interaction between the indicator for being employed in a domestic firm and the FDI shock variable thus provides an estimate of the **indirect effect** of FDI liberalization on job market outcomes for workers *not* employed by multinational corporations.

The baseline specification includes worker-level fixed effects (ϕ_i), controlling for unobservable time-invariant worker characteristics. In addition, the dimensionality of the FDI exposure proxy permits controlling for unobservable factors at the sector-region, sector-year, and region-year levels through the inclusion of corresponding fixed effects. Following prior studies using the RAIS employer-employee data, Equation (2) is estimated, for computational tractability, on a random 10% sample of the universe of valid individual IDs from 1985 to 2010.[20] Standard errors are clustered at the worker level.

• *Identification*. Equation (2) provides a unified empirical framework to disentangle the consequences of the FDI liberalization, simulaneously analyzing (i) the direct effect of employment in a multinational corporation and (ii) the impact of a large multinational entry shock on individuals remaining in domestic firms.

The inclusion of worker-level fixed effects implies that the direct effect is identified through changes in $\mathbb{I}(\text{MNC})_{i,f(jr),t}$. Such changes arise from worker i moving from a

[18] The mean monthly wage is calculated by dividing the total wage obtained in the firm during the calendar year by the number of months worked at that firm. In alternative specifications, I use the wage in the last month worked, obtaining very similar results.

[19] Excluding firm f itself allows us to further separate the impact of increased MNC presence in the local labor market from any effects arising from a worker's own firm changing ownership status.

[20] The full employer-employee dataset comprises approximately 650 million observations, rendering it computationally intractable to use the entire dataset. The random sample approach in this paper mirrors that of Dix-Carneiro and Kovak (2017). Note this random sampling applies only to the individual-level regressions; all aggregate variables (e.g. FDI Shock$_{f,(jr),t}$) are created using the complete set of employer-employee records. All firm level regressions also use the complete set of employer-employee records.

domestic firm f' to a multinational firm affiliate f or worker i remaining at firm f when the firm changes its status from a domestic firm to a multinational firm affiliate. The control group thus consists of all individuals that do not move from a domestic firm to a multinational firm affiliate. In Section 3.4, I explore an alternative specification where the control group is defined as the set of individuals who experience any job-to-job transition (ever switchers), along with other robustness checks.

The identification of the indirect effect relies on post-liberalization changes in the share of workers employed by multinational companies within a given sector-region cell. Implicitly, the variation across sectors within a micro-region stems from the removal of pre-liberalization sector-specific FDI restrictions. As noted in Section 2.3, while the liberalization led to an increased presence of multinational firms across the board, industries for which sector-specific restrictions were lifted experienced a much sharper increase. Importantly, in the baseline specification I control for sectoral and regional time-varying unobservable factors that may otherwise confound the relationship between the FDI entry shock and labor market outcomes. For example, the sector-year fixed effects absorb sector-specific technological and productivity changes and fluctuations in commodity prices, while the region-year fixed effects account for differences in regional labor market conditions arising from industrial policies, regional macroeconomic shocks, and infrastructure investments.

There are several advantages of this single-equation reduced-form framework at the individual level relative to using more aggregate estimations or estimating separate equations for direct and indirect effects. First, it enables me to control for individual-level unobservable characteristics such as ability, motivation, or time-invariant preferences, both in the direct and indirect effects. Second, the approach leverages within-worker changes in employer status for the identification of the direct effect. Third, the framework consistently controls for the evolving composition of sector-region units, which is crucial given the length of the period analyzed. Fourth, it ensures both direct and indirect effects are estimated under identical fixed effect structures and sample compositions, which would not be feasible when estimating separate equations. Finally, this design facilitates directly exploring heterogeneity by worker characteristics.

3.2. ***Impact on Workers***

• *Effect on Wages*. Table 2 presents the baseline results from estimating Equation (2), where the dependent variable is the average monthly wage of individual i in firm f at time t. Consistent with previous studies such as Setzler and Tintelnot (2021) and Alfaro-Ureña et al., (2021), wages in multinational corporations are, on average, approximately

23% higher than in domestic firms. Note that this baseline specification accounts for time-invariant worker characteristics as well as sectoral and regional trends but does not control for time-varying worker attributes, occupation, or contract type. Table D1 in the Appendix sequentially incorporates these additional controls, revealing a similar albeit slightly smaller wage premium in multinational corporations of 19-23% (for the full set of robustness checks, see Section 3.4).

Table 2 also presents the indirect effect of increased exposure to multinational corporations on workers in domestic firms following the FDI liberalization. Overall, the effect is negative but relatively small: a 10-percentage-point increase in the MNC employment share within a given sector-microregion is associated with a 0.06% decrease in wages for workers in domestic firms.

Table 2: The Effect of the FDI Liberalization on Worker Wages

$y_{i,f(sr),t}$: *Wage*	(1)
Works in $MNC_{i,f(sr),t}$ *(Direct)*	0.228^{***}
	(0.001)
FDI Shock$_{f(sr),t}$ *(Indirect)*	-0.006^{***}
	(0.001)
Fixed Effects	
Sector-Microregion	Yes
Sector-Year	Yes
Microregion-Year	Yes
Worker	Yes
Observations	30,181,966

This table shows the results from estimating Equation (2). Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

• *Effect on Wages - By Educational Attainment*. As discussed in Section 2.3, multinational companies disproportionately hire highly educated individuals, suggesting that the impact of the FDI liberalization may vary by educational attainment level. In Table 3, the key explanatory variables——direct and indirect effects——are interacted with binary variables that take a value of one if workers fall into one of the following educational categories: incomplete high school (Column 1), complete high school without completed university studies (Column 2), and college graduates (Column 3). The estimation is conducted through a single regression using interaction terms.

I find that the wage premium for workers in multinational corporations increases with educational attainment: workers with incomplete high school earn, on average, 18% more in multinational firms compared to their counterparts in domestic firms; those with a complete high school education earn 20% more, while college graduates receive a substantial 30% premium.

The indirect effect also varies significantly with the educational attainment of workers in domestic firms. Those with incomplete high school are the most negatively affected: a 10-percentage-point increase in the employment share of MNCs within a given sector-microregion leads to a 0.7% decline in their wages. The effect is also negative, though less pronounced, for high school graduates, where the same increase is associated with a 0.2% wage reduction. In contrast, for college graduates, a 10-percentage-point expansion in MNC employment share corresponds to a 1.4% wage increase.

Table 3: The Effect of the FDI Liberalization on Worker Wages, by Educational Attainment Level

$y_{i,f(sr),t}$: *Wage*	*No HS* (1)	*HS* (2)	*College* (3)
Works in $MNC_{i,f(sr),t}$ *(Direct)*	0.184^{***}	0.200^{***}	0.302^{***}
	(0.001)	(0.001)	(0.001)
FDI Shock$_{f(sr),t}$ *(Indirect)*	-0.070^{***}	-0.020^{***}	0.141^{***}
	(0.002)	(0.002)	(0.002)
Fixed Effects			
Sector-Microregion	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes
Worker	Yes	Yes	Yes
Observations	30,181,966		

This table shows the results from estimating Equation (2). Column 1 shows the result for individuals that have not completed high school education, Column 2 those for individuals with completed high school and Column 3 for college graduates. Note that all three columns are estimated in a single regression with interaction terms. Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

• *Effect on Worker Employment Flows*. Next, I assess the indirect effect of exposure to multinational companies on the probability that an individual employed in a domestic firm is hired or laid off. The variable *hired* is defined as a binary indicator that takes a value of one if worker i starts employment at a new company $f(s,r)$ operating in sector s and microregion r at time t. Similarly, the variable *laid-off* is defined as a binary indicator that takes a value of one if worker i separates from company $f(s,r)$ at time t.

As seen in Table 4 the overall effect is very small and not statistically significant at conventional confidence levels (i.e. 95%): on the aggregate, workers in domestic companies do not appear to experience a meaningful change in the probability of being hired or laid off due to increased exposure to multinational companies. However, this result masks significant heterogeneity by educational attainment. Workers without completed high school education see a decline in their annual probability of being hired (by 0.13% for a 10-percentage-point increase in the MNC employment share) and an increase in their probability of being laid off (by 0.05% for the same increase). In contrast, individuals with a high school diploma experience a

small but statistically significant rise in their probability to be hired, while college graduates see an even larger increase (0.07% and 0.29%, respectively, for a 10-percentage-point increase). Both groups of skilled workers seem to be insulated from the increased risk of layoffs found for individuals without completed high school.

Table 4: The Indirect Effect of the FDI Liberalization on Worker Employment Flows

$y_{i,f(sr),t} =$	*Hired*		*Laid-off*	
	(1)	(2)	(3)	(4)
$FDI\ Shock_{f(s,r),t}$	0.002*		0.001	
	(0.001)		(0.001)	
$FDI\ Shock_{f(s,r),t} \times \text{No HS}_i$		-0.013**		0.005***
		(0.001)		(0.001)
$FDI\ Shock_{f(s,r),t} \times \text{HS}_i$		0.007***		-0.003
		(0.002)		(0.002)
$FDI\ Shock_{f(s,r),t} \times \text{College}_i$		0.029***		0.000
		(0.002)		(0.002)
Fixed Effects				
Sector–Microregion	Yes	Yes	Yes	Yes
Sector–Year	Yes	Yes	Yes	Yes
Microregion–Year	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes
Observations	40,080,379	40,080,379	40,080,379	40,080,379

This table shows the results from estimating Equation (2) where the dependent variable are binary variables that take value one if worker i is hired at (or laid off from) firm f operating in sector s and region r at time t. Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

The results reveal a clear heterogeneity in labor market outcomes following the FDI liberalization. Workers in multinational affiliates, especially college graduates, receive substantial wage premiums. In contrast, the indirect effects on employees in domestic firms are more varied. While college-educated workers experience modest wage gains, those with lower levels of education tend to face wage reductions, are less likely to secure employment, and are more prone to layoffs. Overall, the FDI liberalization can thus be viewed as a skill-biased shock that primarily benefits college-educated workers. The results can be summarized in the following reduced form findings:

Reduced Form Finding 1: Direct effect on MNE workers. MNE employees have substantial wage premiums that increase with skill level.

Reduced Form Finding 2: Indirect effect on domestic firm workers. The effect on domestic firm workers is highly heterogeneous: high-skilled workers in domestic firms benefit through wage gains and improved employment opportunities, while

low-skilled workers face wage reductions, higher layoff rates, and lower hiring probabilities.

3.3. *Impact on Domestic Firms*

Having examined the effects of FDI liberalization on workers in domestic firms, I now turn to its impact on these firms themselves. Specifically, I assess whether the increased competitive pressure from multinational entry following liberalization influenced the survival rate of domestic firms or led to a reduction in their labor force. To explore this, I estimate the following empirical model, which closely follows the baseline estimation but is now applied to a panel of domestic firms covering the period from 1995 to 2010:

$$z_{f(jr),t} = \beta \, \mathbb{I}(\text{Dom})_{f(jr),t} \times \text{FDI Shock}_{f(jr),t} + \phi_f + \omega_{\text{jr}} + \omega_{\text{j,t}} + \omega_{\text{r,t}} + \varepsilon_{f(jr),t} \quad (3)$$

where $z_{f(jr),t}$ is an outcome of domestic firm f operating in sector j and microregion r at time t. FDI Shock$_{f(jr),t}$ is defined as in Baseline Equation 2 -the post-liberalization increase in the share of MNC employment in sector-microregion jr. The same set of sectoral and regional fixed effects (ω_{jr}, $\omega_{\text{j,t}}$, $\omega_{\text{r,t}}$) is included. Additionally, I incorporate firm fixed effects to capture within-firm changes driven by increased MNC exposure.

The results, presented in Table 5, indicate that greater exposure to MNC entry is associated with an increased likelihood of firm closure. Specifically, a 10pp increase in the MNC employment share corresponds to a 0.05 pp. rise in the *annual* probability of closure. For larger firms, which may be more likely to compete directly with MNCs, the increase in the annual probability of closure is 0.1pp. Additionally, increased MNC presence is linked to a downsizing of domestic firms. A 10pp rise in MNC employment share within a given local labor market is associated with an approximate 1% reduction in the number of employees in domestic firms.

The effect on domestic firms can thus be summarized as follows:

Reduced Form Finding 3: Competitive pressure on domestic firms. MNE entry leads to firm closures and downsizing among domestic firms operating in the same sector-region.

3.4. *Extensions and Robustness*

This section presents a comprehensive set of robustness checks and extensions. I first validate the main findings using aggregate regional data and examine informality as an

Table 5: The Effect of the FDI Liberalization on Domestic Firms

$Z_{f(sr),t} =$	*Firm Closure*$_{f,t}$		*Number of Employees*$_{f,t}$	
	Firms $>$ 10 Employees (1)	*Firms* $>$ 50 Employees (2)	*Firms* $>$ 10 Employees (3)	*Firms* $>$ 50 Employees (4)
FDI Shock$_{f(s,r),t}$	0.005***	0.010***	-0.083***	-0.107***
	(0.001)	(0.002)	(0.004)	(0.005)
Fixed Effects				
Sector-Microregion	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Observations	40,080,379	40,080,379	40,080,379	40,080,379

This table shows the results from estimating Equation (3). In Columns 1 and 2, the dependent variable is a binary variable that takes value one if the firm f closes at time t. In Columns 3 and 4 the dependent variable is the number of employees at firm f at time t. Source: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

important margin of adjustment. I then present additional robustness checks for the direct effects on MNC workers, followed by alternative specifications for the indirect effects on domestic firm workers.

• *Aggregate Regional Effect and Dynamics*. Thus far, the analysis has focused on individual and firm-level outcomes, revealing a skill-biased effect of the FDI liberalization that benefited college-educated workers while adversely impacting lower-skilled individuals in domestic firms. Next, I examine the broader regional labor market dynamics by analyzing the aggregate impact of multinational entry on microregion-level outcomes. For that purpose, I use the following specification:

$$y_{r,t} - y_{r,1994} = \beta_t \text{ FDI Shock}_r + \gamma X_{r,t} + \omega_{s,t} + \varepsilon_{r,t} \quad (4)$$

where $y_{r,t} - y_{r,1994}$ represents the change in an aggregate labor market outcome in microregion r between 1994 and t. FDI Shock$_r$ is the total post-liberalization change in the share of formal workers employed in multinational firms within microregion r, which is partly driven by the removal of sector-specific FDI restrictions. β_t thus captures the dynamics of the impact of the FDI liberalization on the labor market outcome in microregion r over time. $\omega_{s,t}$ refers to state-year fixed effects, which are added to control for confounding broad regional trends. I also control for microregion-year covariates, namely microregion-level GDP and the tariff reductions from the preceding trade liberalization -as in Dix Carneiro and Kovak, 2017, on which this aggregate specification is based-.

The results, presented in Appendix Figure E6, illustrate the aggregate labor market effects of the FDI liberalization, highlighting both overall employment trends and the

differential impact by skill level. The absence of clear pre-trends before 1995 supports the identification strategy, as labor market outcomes remained stable prior to the reform. While the liberalization has little impact on total employment, I find—consistent with the results in prior sections— evidence of significant heterogeneity between skilled and unskilled workers, with employment increasing for the former and decreasing for the latter. The ratio of skilled to unskilled wages also rises. The impact is persistent, with the full effects of the FDI liberalization taking at least a decade to fully materialize.[21].

• *Informality and Margins of Adjustment*. I also examine how unskilled workers who moved out of formal employment in response to the FDI liberalization adjusted to these changes. Workers could become unemployed, drop out of the labor force, or transition into informal employment. Brazil had a very high informality rate throughout the sample period, ranging from approximately 40% to 55% (Ulyssea, 2018). To analyze these transitions, I use data from the 1991, 2000, and 2010 Decennial Censuses (as in Dix Carneiro and Kovak, 2019, and Imbert and Ulyssea, 2024). Given the data constraints, I estimate a specification similar to Equation 4, but in a long-difference framework where changes in labor market outcomes are measured across Census waves rather than annually.

The results, shown in Appendix Figure E7, indicate that the primary adjustment mechanism for unskilled workers was a shift towards informality. A 10 percentage point increase in the MNC employment share is associated with a 0.17% increase in the informality rate. I find no evidence of an effect on unemployment rates, suggesting that job displacement from the formal sector was largely absorbed by the informal labor market rather than leading to outright joblessness.[22] For skilled workers, I find no evidence of significant effects on either unemployment or informality rates.

• *Direct Effect on MNC workers - Additional Controls*. I then assess the robustness of the main findings regarding the direct impact on workers employed by multinational corporations (MNCs). In the baseline specification, I include worker fixed effects as well as sector-year, sector-region, and region-year fixed effects, allowing for a unified framework to analyze both the direct and indirect effects.[23] However, since the identification of the direct effect relies on within-worker changes when transitioning from domestic to multinational firms, a more stringent set of fixed effects and controls

[21]This is consistent with the evidence on slow adjustment dynamics following the earlier trade liberalization in Dix Carneiro and Kovak, (2017)

[22]There is some evidence of a small negative effect on the employment rate, suggesting that a subset of unskilled workers dropped out of the labor force. However, the bulk of the negative impact was absorbed by increased informality.

[23]The indirect exposure to the FDI liberalization in a given local labor market, as proxied by FDI Shock$_{f(jr),t}$ in Equation (2), varies at the region-sector-year level and thus region-sector-year fixed effects would fully absorb such variation.

can be introduced when focusing specifically on the direct effect for MNC workers.

Table D1 in the Appendix progressively incorporates additional controls into Equation (2): sector-region-year fixed effects (Column 1), occupation fixed effects (Column 2), and controls for worker tenure in their current firm and accumulated experience (Column 3).[24] Additionally, in Column 4, I control for contract characteristics by introducing binary indicators for part-time employment, temporary work, and fixed-term contracts. Appendix Table D2 replicates this robustness analysis for estimations disaggregated by educational attainment.

The results remain consistent with those in the baseline specification: I find a positive and significant MNC wage premium, ranging between 19.5% and 23%. As in the baseline analysis, college-educated workers experience a substantially larger wage premium (30-35%) compared to high school graduates (16-20%) and workers without a completed high school education (13-16%).

• *Direct Effect on MNC workers - Event Study Switcher Design*. Next, I implement an event study design to track the wage trajectory of workers who move from domestic to multinational firms (domestic-to-MNC switchers) before and after their transition. To ensure comparability, I restrict the sample to workers who remained in the same firm for at least three years before switching to a new employer, where they stayed for an additional three or more years. The control group consists of other job switchers, allowing for a clean comparison of the wage dynamics associated with switching to an MNC relative to alternative transitions. This restriction on tenure at both the origin and destination firms helps isolate the causal effect of the domestic-to-MNC transition from other job changes while enabling an examination of pre-trends. This approach is similar to that used in Card et al. (2018). Formally, I estimate the following model:

$$\Delta^k y_{i,f(jr),t} = \sum_{k=\underline{K}}^{\overline{K}} \alpha_k \, \mathbb{I}(\text{Dom})_{i,f',t-1} \times \mathbb{I}(\text{MNC})_{i,f,t} \; + \; + \omega_{\text{jr}} \; + \; \omega_{\text{j,t}} \; + \; \omega_{\text{r,t}} \; + \; \varepsilon_{i,f(jr),t} \quad (5)$$

where $\Delta^k y_{i,f(jr),t}$ represents the change in a worker-level outcome between time t and $t+k$. The term $\mathbb{I}(\text{Dom})_{i,f',t-1} \times \mathbb{I}(\text{MNC})_{i,f,t}$ is a binary indicator that equals one if worker i transitions from a domestic firm at time $t-1$ to a multinational firm at time t. The index $k \in [\underline{K}, \overline{K}]$ denotes the event window, capturing the number of years before and after the transition.

The results are presented in Appendix Figure D3 , which depicts the dynamics from $t-5$ (five years before the transition) to $t+5$ (five years after the transition).

[24] Worker tenure in their current firm is directly observed in the employer-employee data. Worker experience is constructed using employer-employee records from the decade preceding the FDI liberalization (1985-1994). Given the nonlinear relationship between tenure, experience, and wages (e.g., Setzler and Tintelnot, 2021), I include a third-order polynomial for both variables.

Subfigure (a) estimates Equation (2), while Subfigure (b) extends the specification by incorporating occupation fixed effects to account for potential differences across occupations. Subfigures (c) and (d) display the results disaggregated by educational attainment level, without and with occupation fixed effects, respectively.

Consistent with the baseline specification in the previous Section, I find that workers who transition to multinational firms experience a significant wage increase relative to those who move to other firms. Two years after the transition, wages are approximately 15% higher, with the gap widening by an additional 2-3 percentage points to 17% after five years. Importantly, there is no evidence of pre-trends, particularly after accounting for occupation fixed effects. The event study switcher design further supports an MNC wage premium that increases with educational attainment. College-educated workers who transition to multinational firms experience a wage increase of approximately 20% compared to similarly educated workers who switch to other firms. For high school graduates, the corresponding increase is around 10%, while workers without a completed high school education see a more modest gain of 5-7%.

• *Direct Effect on MNC workers - Long-term Impact*. So far, the direct effect analysis has focused on the effect on wages of MNC employment. In this subsection I explore the effect on lifetime outcomes including job stability. For that purpose, I focus on the effect of an individual starting its career in a multinational firm vs. a domestic firm. I then use the long employer-employee panel (covering more than 25 years of information). For this exercise I restrict the sample to the cohort of workers born between 1960 and 1985 and for which there is at least 15 years of data. These criteria follow other studies of lifetime outcomes such as Guvenen et al. (2022) and Arellano-Bover (2024). Formally, I estimate the following model:

$$y_{i(r,c)} = \alpha \mathbb{I}(\text{MNC})_{i,f} + \beta X_i + \omega_{\text{r}} + \omega_{\text{c}} + \varepsilon_i \tag{6}$$

where $y_{i(r,c)}$ refers to a lifetime outcome of individual c of cohort c that starts it career in region r. $\mathbb{I}(\text{MNC})_{i,f}$ is a binary indicator that takes value one if the individual's first formal full-time job is in a multinational firm. The estimation includes the vector X_i of individual-level controls (education, gender, career length) along with region (ω_{r}) and cohort (ω_{c}) fixed effects.

I find that workers that start their career in a multinational firm have significantly higher lifetime earnings: approximately 41% higher (see Appendix Figure D8). As in prior estimations, the increase is larger for more educated workers, rising from 31% for individuals without completed high school studies to 37% for high school graduates and 49% for college graduates.

Workers who begin their careers in a multinational corporation also experience significantly greater job stability. They tend to have fewer employers over their careers, are less likely to switch sectors, and spend fewer years out of formal employment (see Appendix Figure

• *Indirect Effect on domestic firm workers - Alternative FDI exposure proxies*. In the baseline estimation of the indirect effect, I proxy a domestic firm worker's exposure to the FDI liberalization using the change in the share of employment in multinational corporations between 1995 and year t within the microregion-sector where their employer operates. In Tables E1 and E2 of the Appendix, I explore alternative proxies. First, I use the change in employment in all FDI recipients, which includes both firms where the global ultimate parent (i.e., multinational corporations) can be identified and firms with foreign capital inflows but no identifiable global ultimate parent. Second, I use the post-liberalization change in the total number of multinational firms operating in a given microregion-sector. Lastly, I consider the post-liberalization change in the total number of FDI recipients. The results remain consistent with the baseline estimation: wages of college-educated workers increase, wages of individuals without a high school diploma decline, and the aggregate effect on wages in domestic firms remains slightly negative.

• *Indirect Effect on domestic firm workers - Industries with Sector-Specific Restrictions*. The source of identifying variation for the indirect effect is the within-region-sector change in the employment share of MNCs. As discussed in the preceding sections, while MNC employment shares increased across all sectors, the rise was particularly pronounced in industries that had sector-specific FDI restrictions prior to the liberalization. In Table E3 of the Appendix, I separate the indirect effect of exposure between industries with and without these pre-liberalization restrictions. In both groups, exposure to multinational entry had a similar skill-biased effect——reducing wages for individuals without a high school diploma while increasing wages for college graduates. However, the skill-biased effect was particularly pronounced in industries previously subject to sector-specific restrictions. A 10-percentage-point increase in the MNC employment share in these industries led to an almost 1% rise in wages for college-educated individuals (compared to 0.7% in unrestricted industries) and a 0.9% decline in wages for workers without a high school diploma (compared to 0.4% in unrestricted industries). This may hint at policymakers having originally restricted FDI in precisely those sectors where its impact on domestic firms and employees was expected to be particularly large.

3.5. *Additional Heterogeneity: Sector, Occupation, Worker and Firm Characteristics*

• *Heterogeneity by Sector*. I first explore sectoral heterogeneity along several dimensions. I study differentiated impacts for tradable and non-tradable sectors, and examine differences according to the level of innovation intensity of the sector in Brazil.[25]

I find no significant differences in MNC premia between tradable and non-tradable sectors (Appendix Figure D5). Similarly, the wage premium remains consistent across industries with varying levels of innovation, whether measured by the share of firms in Brazil holding patents or by the proportion of firms implementing product innovations. This suggests that the benefits of MNC employment are broadly distributed across different types of economic activities rather than concentrated in specific sectors.

• *Heterogeneity by Occupation Group*. To examine heterogeneity across occupations, I interact the MNC indicator with broad occupational categories based on the 1-digit ISCO (International Standard Classification of Occupations) code. The results reveal substantial variation in wage effects across occupations, which follow the skill-intensity pattern found in the baseline analysis for heterogeneity by educational attainment level.

For workers directly employed by MNCs, managerial positions exhibit the highest wage premium at 45%, followed by professional (33%) and technical (26%) occupations. In contrast, production workers (17%), administrative workers (14%), and service workers (13%) receive significantly lower, albeit still positive, wage premia (Appendix Table D6).

As in the case of heterogeneity by education level, indirect effects on workers in domestic firms show stark differences by the skill-intensity of the occupation. Workers in production, administrative, and service roles within domestic firms experience significant wage declines, with a 10-percentage-point increase in MNC employment share associated with wage reductions of 0.5% to 0.7%. In contrast, the same MNC entry shock is linked to wage increases for domestic firm employees in managerial, professional, and technical roles—rising by 2.9%, 1.9%, and 0.6%, respectively (Appendix Figure E4).

• *Heterogeneity by Task Content*. I next examine heterogeneity based on the task content of occupations, using data from the Occupational Information Network (ONET).[26] I explore whether wage effects vary according to the cognitive, routine,

[25]For this purpose I use alternatively (i) the share of firms in Brazil holding patents and (ii) the share of firms implementing product innovations. I use data from the 1998 (manufacturing) and 2003 (services) waves of the Brazilian Innovation Survey PINTEC.

[26]Specifically, I use the concordance between the Brazilian Occupational Classification (CBO) and ONET developed by Sulzbach et al., 2022.

manual, and social task intensity of occupations, distinguishing between jobs above and below the median in each category.

For direct MNC employment, occupations specialized in cognitive and social tasks benefit from significantly higher premia (27%), compared to those with lower cognitive or social content (19%). However, I find no significant differences in the MNC wage premium based on the routine or manual task content of occupations.

The heterogeneity by job task intensity for workers in domestic firms further suggests that occupations with a high share of cognitive and social tasks benefit the most from FDI liberalization.

• *Heterogeneity by Worker Demographics*. I then examine the heterogeneity of the effects by gender and age. For workers directly employed by MNCs, the wage premium is higher for men (24%) than for women (19%), suggesting that men benefit more from wage gains associated with multinational employment (Appendix Figure D7). This finding is in line with Bøler et al. (2018), which shows that exporting firms exhibit a higher gender wage gap due to the greater flexibility demands placed on employees, such as accommodating time zone differences and travel requirements. The age group with the largest MNC premium corresponds to individuals between 30 and 45 years.

The indirect effects on domestic firm workers are also heterogeneous by age and gender. Women and workers over 45 years old are disproportionately more likely to experience negative effects from increased MNC presence (Appendix Figure E5). This suggests that FDI liberalization may exacerbate existing labor market inequalities, benefiting prime-age male workers while potentially disadvantaging women and older workers in domestic firms.

• *Heterogeneity by MNC Characteristics*. Finally, I examine how wage premia in multinational firms vary based on the characteristics of the global ultimate parent company, including its global number of affiliates, the number of countries in which it operates, whether its country of origin is classified as high-income, and whether it is headquartered within the same region (i.e., Latin America). This analysis uses information from the global ultimate parent company from Dun and Bradstreet's Worldbase.

Multinational corporations with a larger global network of affiliates offer higher wage premiums (Appendix Figure D4). Specifically, the MNC wage premium for global ultimate parent companies with fewer than 10 affiliates worldwide is 17%, increases slightly to 18% for those with 10 to 50 affiliates, and rises to 26% for firms with 50 or more affiliates. A similar pattern emerges when considering the geographic scope of MNC operations: firms operating in 50 or more countries offer a 29% wage premium, compared to 22% for those present in 10 to 50 countries, and 16% for those

with operations in fewer than 10 countries. The wage premium is also slightly higher for multinational corporations headquartered outside of Latin America and for those originating from OECD countries.

4. A Model of Skill-Biased Multinational Entry with Labor Market Frictions

The empirical analysis above showed three main reduced-form findings: (1) a significant MNE wage premium that grows with skill level, (2) a skill-biased effect on domestic firm workers, with college-educated workers disproportionately benefiting and those without a high school diploma being worse off, and (3) a negative impact on domestic firms, which are more likely to close or downsize due to competitive pressure. In addition, the main adjustment margin for laid-off unskilled workers is towards informality.

Guided by these reduced form facts, this section develops a dynamic general equilibrium model with multinational production and frictional labor markets, designed to capture the observed empirical regularities. The model incorporates firm heterogeneity in productivity and a skill-biased production technology where the relative efficiency of workers with heterogeneous skills varies with the productivity level of their employing firms. It also features search and matching frictions: posting vacancies is costly, and these vacancies are filled according to endogenous rates determined within the matching process. Crucially, and in line with the empirical finding that informality serves as a primary adjustment margin for laid-off unskilled workers, the model features an informal sector where individuals not formally employed work. The interplay of these search frictions with firm heterogeneity endogenously creates a job ladder; more productive firms, needing to deter poaching and attract talent, offer higher wages, thus generating skill-specific wage premia (as in Reduced Form Finding 1). In the product market, firms compete monopolistically and face stochastic, per-period fixed operating costs that differ according to their origin (foreign or domestic). Within this framework, multinational firm entry induces differentiated effects across skill groups due to the skill-biased technology (as in Reduced Form Finding 2), and simultaneously intensifies competitive pressures on incumbent domestic firms in both output and input markets (as in Reduced Form Finding 3).

The model departs, following Bilal and Lhuilier (2024), from the traditional assumption in the wage posting literature of perfectly substitutable workers and a linear production function (e.g. Burdett and Mortensen 1998; Card et al. 2018; Engbom and Moser, 2022; Berger et al. 2022). I instead embed a skill-biased production function (used in, e.g. Burstein and Vogel, 2017) into a wage posting model with heterogeneous firms and workers.

4.1. *Environment*

• *Setup*. The model describes an economy with two countries —home (d) and foreign (f). Time is discrete and indexed by t. The economy is populated by two types of heterogeneous agents: workers and firms.

Workers are distinguished by an exogenously determined, permanent skill type $s \in S$. There are $|S|$ discrete skill categories in total. The mass of workers with skill type s in country $c \in d, f$ is fixed at $L_{c,s}$.

Firms are characterized by their productivity level $\theta \in [\underline{\theta}, \bar{\theta}]$, drawn from a continuous distribution $\Gamma(\theta)$. There is a mass M_d of potential domestic entrants and a mass M_f of potential foreign entrants. To operate in a given market, firms must pay a per-period fixed cost. This fixed cost is stochastic, and its distribution depends on whether the firm originates from country d ($f_d \sim D_d(\cdot)$) or from country f ($f_f \sim D_f(\cdot)$). The differing distributions of fixed costs are intended to be flexible enough to accommodate variations in fixed operating costs that depend on a firm's country of origin.

• *Household Preferences* There is a representative household in each country $c \in \{d, f\}$ that derives utility from consumption of a final composite good Q_c. This composite good is a CES aggregate of the quantities of all differentiated varieties $q_{f,d}$ supplied by firms f operating in the domestic market:

$$Q_d = \left(\sum_f q_{f,d}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{7}$$

where $\sigma > 1$ is the elasticity of substitution across varieties. The representative household maximizes utility subject to its aggregate budget constraint, implying the following demand for variety f:

$$q_{f,d} = Y_d \left(\frac{p_{f,d}}{P_d} \right)^{-\sigma} \tag{8}$$

where $p_{f,d}$ denotes the price of variety f in the domestic market, Y_d is aggregate income, and P_d is the aggregate price index, given by:

$$P_d = \left(\sum_f p_{f,d}^{1-\sigma} \right)^{1/(1-\sigma)} \tag{9}$$

4.2. *Labor Market Frictions*

Next, I describe the labor-market frictions built into the model. Note that, for ease of exposition, the country index c is dropped throughout this subsection.

• *Informality.* Workers of each skill type s can be in one of two states: formally employed in a firm (N_s) or active in an informal sector (I_s). The total labor of skill s is thus allocated between these two sectors: $L_s = N_s + I_s$. Workers in the informal sector receive an exogenous real income b_s, which can be interpreted as the wage individuals obtain working informally. There is on-the-job search; that is, both formally employed workers and those in the informal sector actively search for formal job opportunities.

• *Search and matching.* Formal-sector jobs are created through a matching process that brings together searching workers and firms with vacancies. The total number of new matches formed for skill type s is determined by a constant returns to scale matching function:

$$M_s = \mathcal{M}(V_s, S_s) = \mu_s (V_s)^{\epsilon} (S_s)^{1-\epsilon} \tag{10}$$

where V_s is the aggregate number of vacancies posted by firms for workers of skill s, and S_s is the aggregate effective number of job seekers of skill s. It comprises individuals searching from the informal sector and those searching while formally employed (on-the-job search): $S_s = I_s + \xi_s N_s$. ξ_s is the relative search efficiency of employed workers compared to those in the informal sector. μ_s represents the efficiency of the matching process for skill s, and $\epsilon \in (0, 1)$ is the elasticity of the matching function with respect to aggregate vacancies.

The interaction between vacancy-posting firms and searching workers determines the aggregate conditions in the labor market for each skill type s. A key indicator of these conditions is labor-market tightness, Θ_s, defined as, for a given skill level, the ratio of aggregate vacancies to aggregate effective job seekers ($\Theta_s = V_s / S_s$). Given the matching function in Equation 10, the probability of a firm filling an open vacancy for a skill s worker, q_s, can be expressed as a function of tightness: $q_s = \mu_s \left(\frac{V_s}{S_s}\right)^{\epsilon-1} = \mu_s \Theta_s^{\epsilon-1}$.

Similarly, the probability that an individual in the informal sector finds a formal job, $\lambda_{U,s}$, is: $\lambda_{U,s} = \mu_s \left(\frac{V_s}{S_s}\right)^{\epsilon} = \mu_s \Theta_s^{\epsilon}$. For workers already employed in the formal sector, the job-finding probability $\lambda_{E,s}$ is scaled by their relative search efficiency ξ_s: $\lambda_{E,s} = \xi_s \lambda_{U,s}$.

These endogenous transition probabilities govern the flows of workers between employment states and are crucial for determining firm hiring dynamics and the overall allocation of labor in equilibrium.

• *Worker Separation and Poaching.* There are two distinct sources of separation. First, workers are subject to exogenous separation shocks, which occur at skill-specific rate δ_s. A worker experiencing such a shock transitions out of their current firm into informality. Second, employed workers actively search for alternative opportunities, which arrive at rate $\lambda_{E,s}$. A received offer results in poaching if the offered wage exceeds the worker's current wage.

The total probability that a worker of skill s separates from its employer is thus $\delta_s + \lambda_{E,s}(1 - F_s(w))$, where w is the workers' current wage and $F_s(w)$ is the cumulative distribution of wage offers for skill s.

4.3. ***Firms***

• *Activity and Market Structure.* As outlined in Section 4.1, firms are distinguished by their productivity θ and face stochastic, origin-specific fixed costs of operation. A firm (either domestic or foreign) becomes active in the domestic market if its expected stream of operating profits is sufficient to cover these fixed costs. The mass of active domestic and MNE firms at each productivity level is thus endogenously determined.[27] Active firms operate under monopolistic competition, each producing a unique variety of a differentiated good for which consumers have CES preferences (Equation 7).

• *Skill-Biased Production Technology.* Output y_f for a given firm f depends on its productivity level θ_f and a composite labor input, which aggregates skill types $s \in S$ according to a CES technology:

$$y_f = \theta_f \left(\sum_{s \in S} a_{f,s}(\theta_f)^{\frac{1}{\eta}} (l_{f,s})^{1-\frac{1}{\eta}} \right)^{\frac{\eta}{\eta-1}} \tag{11}$$

where $l_{f,s}$ is the quantity of labor of skill type s employed by firm f. The parameter $\eta > 0$ is the elasticity of substitution among labor types. The term $a_{f,s}(\theta_f)$ is a skill- and firm-specific efficiency shifter and is itself a function of the firm's productivity θ_f. This formulation captures heterogeneity in how intensively firms use each skill type. Hence its functional form dictates the relationship between a firm's skill intensity and its productivity.

• *Vacancy Posting and Profit Maximization.* Each active firm f chooses its level of vacancy postings $v_{f,s}$ for each skill type s to maximize its current period profit. Profit $\Pi_{f,t}$ equals total revenue $R_f(\theta_f, \{l_{f,s,t}\})$ minus all costs, that is, the wage bill, the vacancy posting costs, and the per-period fixed cost of operation:

$$\Pi_{f,t} = R_f(\theta_f, \{l_{f,s,t}\}) - \sum_{s \in S} w_{f,s,t} l_{f,s,t} - \sum_{s \in S} c_0 v_{f,s,t}^{1+\gamma} - f_k \tag{12}$$

where $k \in \{d, f\}$ denotes the firm's origin. Posting vacancies is costly: the iso-elastic cost of posting $v_{f,s,t}$ vacancies for skill s is $c_0\, v_{f,s,t}^{1+\gamma}$. The labor input $l_{f,s,t}$ consists of the workers employed at the end of the previous period who survive separations (due to

[27] While the productivity distribution of potential entrants is the same for domestic and foreign firms, the differences in fixed costs of entry for both type of firms means that the distribution of productivity for actual entrants will be very different.

exogenous separation and poaching), plus new hires in period t from filled vacancies $q_{s,t}v_{f,s,t}$:

$$l_{f,s,t} = l_{f,s,t-1}\left(1 - \left[\delta_s + \lambda_{E,s}(1 - F_s(w_{f,s,t-1}))\right]\right) + q_{s,t}v_{f,s,t} \tag{13}$$

Given the endogenous wages $w_{f,s,t}$, vacancy filling rates $q_{s,t}$ and its incumbent workforce $l_{f,s,t-1}$, firms maximize profits $\Pi_{f,t}$ subject to the firm-level labor law of motion in Equation 13. The first-order condition for vacancy posting is thus:

$$\left(\frac{\partial R_f(\theta_f, \{l_{f,s,t}\})}{\partial l_{f,s,t}} - w_{f,s,t}\right) \cdot q_{s,t} = c_0(1+\gamma)v_{f,s,t}^{\gamma} \tag{14}$$

Labor market frictions thus create a wedge between the marginal revenue product of labor and the wage offered by firm f for skill s. When every vacancy is filled ($q_{s,t} = 1$) and posting is costless ($c_0 = 0$), the model collapses to the frictionless benchmark.

4.4. *Equilibrium*

- *Market clearing conditions.* The dynamic equilibrium of the economy is characterized by several market clearing conditions that must hold in each period t for country $c \in \{d, f\}$. These conditions ensure consistency across agent decisions and aggregate outcomes:

$$L_s = N_s + I_s = \left(\int_{f_d \in M_d} l_{f_d s} df_d + \int_{f_m \in M_f} l_{f_m s} df_m\right) + I_s; \quad \forall s \in S \tag{15}$$

$$y_{f,t} = q_{f,t}; \quad \forall f \tag{16}$$

$$Y = \sum_{s \in S}\left(\int_{f_d \in M_d} w_{f_d s} l_{f_d s} df_d + \int_{f_m \in M_f} w_{f_m s} l_{f_m s} df_m\right) + \int_{f_d \in M_d} \Pi_{f_d} df_d \tag{17}$$

$$V_s = \int_{f_d \in M_d} v_{f_d s} df_d + \int_{f_m \in M_f} v_{f_m s} df_m \tag{18}$$

Equation 15 represents the market-clearing condition for labor allocation across formal and informal employment, while Equation 16 corresponds to the market clearing condition for the goods' markets. Equation 17 defines the country-level budget constraint, which consists of labor income and profits. Importantly, country c's income Y_c includes only the profits generated by its domestic firms. In other words, foreign multinational companies fully repatriate their profits in the model.[28]

[28] This assumption can be readily relaxed, establishing, for instance, that an exogenously fixed share of profits ρ are repatriated.

Equation 18 indicates that the aggregate stock of vacancies must equal the sum of vacancies posted by all firms in the economy.

In addition to this set of within-period market clearing conditions, a steady-state equilibrium requires an aggregate balance of flows into and out of formal employment:

$$I_{s,t} - I_{s,t-1} = 0; \quad N_{s,t} - N_{s,t-1} = 0; \quad \forall s \in S \tag{19}$$

• *Equilibrium definition.* A within-period equilibrium consists of a set of prices $\{P_c\}$ and $\{p_{c,f}\}$; wages $\{w_{c,f,s}\}$; quantities demanded $\{Q_c\}$ and $\{q_{c,f}\}$; vacancies posted $\{v_{c,f,s}\}$; contact rates $\{\lambda_{U,s}; \lambda_{E,s}\}$, mass of active domestic and foreign firms $\{M_d, M_f\}$; and aggregate vacancies $\{V_s\}$ that satisfy, in each country and in each period, the profit maximization problem for each firm (Equation 12), the goods market clearing condition (Equation 16); the labor market clearing condition (Equation 15); the aggregate budget constraint (Equation 17); and the aggregate vacancies condition (Equation 18). A steady-state equilibrium requires, in addition, that the aggregate labor flows across periods are balanced as in Equation 19.

• *Equilibrium Existence.* As in Bilal and Lhuilier (2024), the equilibrium exists if:

Assumption (1): $(\theta_f \; ; \; l_{f,s}) \longmapsto R(\theta_f \; ; \; l_{f,s})$ is strictly supermodular in all arguments.

In this setting, Assumption (1) implies that the cross-derivatives of productivity $\theta_{f,j}$ and any labor input $l_{j,f,s}$ as well as the cross-derivatives of any two labor inputs must all be strictly positive. As shown in Appendix A1, Assumption (1) will be fulfilled -and thus there will exist an equilibrium- under the following parameter restrictions:

$$\sigma > \eta > 1; \tag{20}$$

$$\frac{\partial}{\partial \theta} \left(\frac{a_s(\theta)}{a_{s'}(\theta)} \right) > 0 \quad \forall s > s' \tag{21}$$

The first parameter restriction $\sigma > \eta > 1$ implies that the elasticity of substitution across product varieties within a sector must exceed the elasticity of substitution across skill types within a firm. This restriction stems from the cross-derivative of labor inputs s and s' being positive ($R_{l_s, l_{s'}} > 0$). As noted by Bilal and Lhuilier (2024) this assumption is compatible with standard parameterizations as most estimates of σ in the literature are between 2.5 and 6 (e.g. Imbs and Mejean, 2015; Broda and Weinstein, 2006), whereas most estimates of η are below 2 (e.g. Katz and Murphy, 1992; Acemoglu and Autor, 2011).

The second parameter restriction implies that the skill intensity must be strictly increasing with the productivity level of the firm. This restriction stems from the

cross-derivative of the productivity of the firm θ and labor input s being positive ($R_{\theta,l_s} > 0$). In the structural estimation, the actual relationship between skill intensity and firm size in Brazil will be used to pin down the direction of this cross-derivative. Across all model estimations -and in line with the descriptive evidence in Section 2.3- I find that larger firms hire skilled workers more intensively and thus empirical evidence in favor of this restriction.

• *Equilibrium wage and Job Ladder.* In the model, firms post wages in every skill-specific labor market. Under the parameter restrictions in Equation 20 and Equation 21 revenue is supermodular and wages increase monotonically with firm productivity θ. The relationship between equilibrium wages and firm productivity can therefore be obtained by taking the first-order condition of the profit function (Equation 12) with respect to wages and integrating it until productivity level θ:

$$w_s(\theta) = b_s \frac{l_s(\underline{\theta})}{l_s(\theta)} + \int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, l_k(\tilde{\theta})_{k=1}^{S})}{\partial l_s} \frac{l_s'(\tilde{\theta})}{l_s(\theta)} d\tilde{\theta} \tag{22}$$

The full derivation can be found in Appendix A2. The equilibrium wage is thus composed of two distinct components. The first term $b_s \frac{l_s(\theta)}{l_s(\theta)}$ represents the *reservation wage effect*. The wage is anchored by the informality wage b_s, which acts as an outside option for workers. This component is scaled by the share of workers for which the informality wage is binding. The second term $\int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, l_k(\tilde{\theta})_{k=1}^{S})}{\partial l_s} \frac{l_s'(\tilde{\theta})}{l_s(\theta)} d\tilde{\theta}$ corresponds to the *job ladder effect*. More productive firms have higher marginal revenue product of labor (MPRL). Given costly vacancy posting, firms have an incentive to retain their workers and pass on part of their surplus to workers. The second term is thus the weighted average of the MPRL from firms with productivities $\underline{\theta}$ up to θ, capturing the wage gains from a worker being employed at a firm of productivity θ rather than a firm at the bottom of the formal sector ladder. In equilibrium, more productive firms will pay higher wages to otherwise identical workers, creating a firm-level wage premia.

4.5. ***The Impact of a Unilateral FDI Liberalization***

I model a unilateral FDI liberalization as a reduction in the entry costs for foreign firms f_f to operate in the domestic market d. This captures the removal of discriminatory barriers against foreign investors, as in Brazil's 1995 constitutional reform.

• *Foreign Firm Entry.* Consider a reduction in foreign entry costs from f_f to f_f', where $f_f' < f_f$. Since firms enter if their expected operating profits exceed fixed costs, the entry condition for a foreign firm with productivity θ is $\mathbb{E}[\Pi(\theta)] \geq f_f$. A reduction in f_f directly affects the composition of active firms by inducing entry of previously excluded

foreign firms. These new entrants will be, on average, less productive than incumbent foreign firms but more productive than domestic firms given that $\mathbb{E}(f_d) < \mathbb{E}(f_f)$.

• *Skill-Biased Reallocation*. The entry of foreign firms generates an upwards shift in relative labor demand for skilled workers through two channels. Firstly, through a *composition effect*: new foreign entrants have higher average productivity than the average of domestic incumbents. Under revenue supermodularity (Assumption 1), skill-specific productivity parameters satisfy $\frac{\partial}{\partial \theta}\left(\frac{a_s(\theta)}{a_{s'}(\theta)}\right) > 0$ for $s > s'$, and thus more productive firms are relatively more intensive in higher-skilled labor. Secondly, through a *wage competition effect*: the job ladder mechanism in Equation 22 implies that firms will pay wages as a weighted average of the marginal product of revenue of less productive firms. Since MPRL rises more steeply with θ for more skilled workers, relative wages for skilled workers will thus further increase.

• *General Equilibrium Effects*. Finally, the liberalization in the model also triggers several general equilibrium adjustments. First, facing intensified competition in both product and input markets, the least productive domestic firms will exit and others will downsize. Second, the entry of productive foreign firms reduces the aggregate price index, providing a positive real income effect for all workers. Finally, foreign firms will capture a higher share of the home country and since they repatriate their profits, this reduces domestic aggregate demand through the aggregate budget constraint in Equation 17.

• *Aggregate Effects*. The aggregate effects of the FDI liberalization will be heterogeneous across worker types. For skilled workers, the effects are unambiguous: the entry of relatively more productive workers will increase the demand for high-skill workers through the skill-biased production technology. They will thus experience higher wages, improved job-finding rates, and enhanced job ladder opportunities. The effect on unskilled workers is, however, ambiguous; depending on (i) the direct effect through the skill-biased technology, (ii) domestic firm exit rates, and (iii) the magnitude of the general equilibrium effects.

5. Model Estimation and Counterfactuals

In this section, I first describe the quantitative setup used to estimate the theoretical model from Section 4, including the functional form assumptions and the parameterization strategy. Next, I discuss the solution algorithm and the estimation fit. Finally, I estimate the labor market effects of a large decrease of average multinational entry cost on a model calibrated to Brazil's 1994 pre-liberalization economy.

5.1. *Quantitative Set-Up*

• *Number of skills.* As in the reduced form setting, I consider three skill levels: college graduates ($s = c$), high school graduates without completed college-level education ($s = hs$), and individuals with, at most, middle school ($s = ms$).

• *Skill-intensity functional forms.* To operationalize the dependence of skill-intensity on productivity, I extend Burstein and Vogel (2017)'s two-skill setup to three skills. The skill-intensity shifters take the following functional forms:

$$a_c(\theta) = \bar{a}_c \theta^{\phi_2}, \quad a_{hs}(\theta) = \bar{a}_{hs} \theta^{-(\phi_1 - \phi_2)}, \quad a_{ms}(\theta) = \bar{a}_{ms} \theta^{-\phi_1} \tag{23}$$

where $\{\bar{a}_c, \bar{a}_{hs}, \bar{a}_{ms}\}$ correspond to the baseline skill-intensity shifters that are common across firms. The parameters ϕ_1 and ϕ_2 thus govern the relationship between skill-intensity and firm productivity θ. The functional forms in Equation 23 imply the following skill-intensity shifter ratios:

$$\frac{a_c(\theta)}{a_{ms}(\theta)} = \frac{\bar{a}_c}{\bar{a}_{ms}} \theta^{\phi_1 + \phi_2}, \quad \frac{a_c(\theta)}{a_{hs}(\theta)} = \frac{\bar{a}_c}{\bar{a}_{hs}} \theta^{\phi_1}, \quad \frac{a_{hs}(\theta)}{a_{ms}(\theta)} = \frac{\bar{a}_{hs}}{\bar{a}_{ms}} \theta^{\phi_2} \tag{24}$$

If both $\phi_1 > 0$ and $\phi_2 > 0$, more productive firms will exhibit a stronger relative demand for higher-skilled workers. This specification thus allows the model to capture skill-biased differences across firms of varying productivity levels. The values of ϕ_1 and ϕ_2 will be freely estimated by targeting the empirical relationship between firm size and skill-intensity in Brazil in 1994.

• *Productivity and Fixed Cost Distributions.* Firm productivities θ are assumed to be drawn independently and identically from a bounded Pareto distribution, with a normalized scale parameter and a shape parameter equal to α_θ. The per-period fixed cost that firms must incur to operate in the market is distributed following origin-specific log-normal distributions such that $f_d \sim LogNormal(\mu_d, \sigma_d)$ and $f_f \sim LogNormal(\mu_f, \sigma_f)$. This specification allows for heterogeneity in fixed costs across firms and by origin, with the parameters for foreign firms potentially reflecting additional barriers of entry for foreign investors. All four parameters $\{\mu_d, \sigma_d, \mu_f, \sigma_f\}$ are estimated by targeting moments of (i) the empirical firm-size distribution by origin and (ii) the relative presence of foreign firms.

5.2. *Model Parameterization*

• *Set of Parameters.* The model is parameterized with Brazilian data from 1994, the last full year before the FDI liberalization. The parameters can be divided into worker and firm parameters and labor-market frictions parameters. The former encompasses $\{L_s, \sigma, \eta, \mu_d, \sigma_d, \mu_f, \sigma_f, a_s, \phi_1, \phi_2, \alpha_\theta\}$; which represent, respectively, the mass of workers

by skill level (L_s), the elasticity of substitution between firm-level varieties (σ), the elasticity of substitution across skill types in production (η), the mean and standard deviation of the fixed cost distribution for foreign and domestic firms ($\mu_d, \sigma_d, \mu_f, \sigma_f$), the productivity of workers by skill level that is common across firms (a_s), the parameters governing the relationship between skill intensity and productivity (ϕ_1, ϕ_2) and the shape parameter of the Pareto distribution (α_θ). The labor market frictions parameters include $\{\gamma, \delta_s, \epsilon, \xi, \mu\}$; which represent, respectively, the curvature of the vacancy costs (γ), the skill-specific exogenous separation rates (δ_s), the matching function elasticity (ϵ), the relative search efficiency of formally employed workers (ξ) and the overall matching efficiency (μ).

In terms of the parameterization strategy, they are also grouped into two categories: (i) those that can be directly assigned using Brazilian data or will be obtained from the literature and (ii) those that are estimated using a simulated method of moments (SMM) procedure.

• *Parameters from Data and Literature*. Table 6 shows the set of parameters that will be directly obtained from Brazilian data or calibrated from literature estimates. The mass of skilled and unskilled workers is directly obtained from RAIS and Census data in 1994. The elasticity of substitution across product varieties is set to 5, which corresponds to the median estimate in the literature using 34 papers reported in Head and Mayer (2014). The elasticity of substitution across skill levels is set to 1.875, following the estimates for Brazil in Fernandez & Messina (2018) and Parente (2024) . It is also in line with estimates in other settings such as Acemoglu and Autor, (2011), who estimate it to be between 1.6 and 1.8 in the United States. The elasticity of the matching function (ϵ) is set to 0.5, following the literature standard set in Petrongolo and Pissarides (2001) . Finally, the relative search efficiency for the employed and the overall matching efficiency follow the average estimates from Bilal and Lhuilier (2024).

Table 6: Calibrated Parameters: Data & Literature)

Parameter	Description	Source	Value
L_s	Labor Supply by Skill	RAIS/Census (1994)	[62, 25, 13]
σ	Demand Elasticity	Head & Mayer (2014)	5.0
η	Skill Substitution Elasticity	Fernandez & Messina (2018)	1.875
ϵ	Matching Elasticity	Petrongolo & Pissarides (2001)	0.5
ξ_s	Employed Search Eff.	Bilal & Lhuilier (2024)	0.126
μ_s	Matching Efficiency	Bilal & Lhuilier (2024)	0.163

• *Parameters estimated via Simulated Method of Moments*. Table 7 shows the set of parameters estimated by matching pre-liberalization empirical patterns in the data with the corresponding patterns in the model through Simulated Method of Moments (SMM). While the set of parameters is jointly estimated, the moment conditions are

chosen to be particularly informative about a specific underlying parameter. In total, there are 11 parameters that are estimated via 12 moment conditions with equal weight. The average foreign fixed cost of entry μ_f, which is particularly important because it will determine multinational entry, is associated with two moment conditions: the pre-liberalization employment share of multinational companies and the median size of the multinational companies operating in Brazil (in terms of number of employees). The variance of the fixed cost of entry σ_f will be matched with the share of MNEs with less than 10 employees. A very small variance implies that very few small MNEs will operate in the domestic market, since the fixed cost of entry will be uniformly large for all potential foreign entrants. Similarly, the mean and the variance of the domestic fixed cost of entry (μ_d and σ_d) will be associated with the median size of domestic firms and the share of domestic firms with less than 10 employees.

The vacancy cost convexity parameter (γ) from the cost function $c_0 v^{1+\gamma}$ determines how rapidly the marginal cost of posting vacancies increases with the number of vacancies posted. For high values of γ, the cost of posting an additional vacancy quickly rises, disproportionately affecting large firms. I thus match this parameter to the share of employment in large firms (those with more than 50 employees in the economy). The Pareto productivity shape parameter (α_θ) is based on the empirical firm size distribution, targeting the P75/P25 ratio of firm size.

The skill intensity parameters are estimated to replicate the elasticity of the skill intensity with respect to firm size in the data. For that purpose, I estimate the following equations:

$$\frac{College_{f(j),t}}{L_{f(j),1994}} = \Gamma_c L_{f(j),1994} + \omega_j + \varepsilon_{f(j),1994} \tag{25}$$

$$\frac{MiddleSchool_{f(j),t}}{L_{f(j),1994}} = \Gamma_{ms} L_{f(j),1994} + \omega_j + \varepsilon_{f(j),1994} \tag{26}$$

where $\frac{College_{f(s),t}}{L_{f(j),1994}}$ and $\frac{MiddleSchool_{f(j),t}}{L_{f(j),1994}}$ are, respectively, the share of college and middle school graduates in firm f operating in sector j in 1994 and $L_{f(j),1994}$ is the total number of workers in firm f (in logs). Γ_c and Γ_{ms} measure the elasticity of skill intensity with respect to firm size (for both college and middle school graduates) and are thus the moments I use to inform the model's skill intensity parameters φ_1 and φ_2 by estimating the corresponding Equations 25 and 26 in the model.

Finally, the exogenous separation rates by skill (δ_s for $s \in \{c, hs, ms\}$ are key in determining the steady state informality rates. Their associated targeted moment is thus the informality rate by skill.

Table 7: Parameters Estimated via Simulated Method of Moments

Parameter	Description	Key Identifying Moment(s)	Value Estimated
μ_f	Mean Fixed Cost MNE	MNE Employment Share and MNE Median Size	15.628
σ_f	Variance Fixed Cost MNE	Share Emp. MNEs <10E	4.786
μ_d	Mean Fixed Cost Dom	Median Size Dom.	2.154
σ_d	Variance Fixed Cost Dom	Share Emp. Dom <10E	1.267
α_θ	Pareto Productivity Shape	P75/P25 Firm Size Ratio	0.908
γ	Vacancy Cost Convexity	Share Emp. Large Firms	0.604
ϕ_1, ϕ_2	Skill Intensity	Skill-Size Slopes	{0.240, 0.105}
$\delta_{ms}, \delta_{hs}, \delta_c$	Separation Rates by Skill	Informality Rates (by Skill)	{0.073, 0.083, 0.084}

5.3. *Estimation*

5.3.1. *Solution Algorithm*

The model is solved using a nested iterative procedure with four layers. The innermost layer solves for firm-level policies sequentially along the productivity grid, the second layer finds the within-period equilibrium by iterating on aggregate variables, the third layer iterates across periods until the employment distribution reaches steady state, and the outermost layer performs simulated method of moments (SMM) estimation by searching over structural parameters to match empirical targets.

Innermost Layer: Sequential Firm Optimization. Given aggregate variables and the beginning-of-period employment distribution, the algorithm solves for firm-level policies by iterating forward along the productivity grid $\theta \in [\underline{\theta}, \bar{\theta}]$. Starting from the lowest productivity level, it sequentially follows the following routine for each firm with productivity θ_i. First, the algorithm computes the firm's skill-specific efficiency parameters from the skill-biased production technology specification in Equation 11. Given the wage schedule $w_s(\theta_i)$ and aggregate variables, the firm's optimal vacancy posting $v_{f,s}$ for each skill type is determined by solving the first-order conditions from Equation 14, which equate the marginal revenue product of posting an additional vacancy to the corresponding marginal costs. The wage schedule is then updated sequentially using the job ladder formula in Equation 22. Wages evolve according to the differential equation implied by firms' optimal wage-setting behavior, where workers' outside options depend on the probability of receiving better offers from more productive firms upstream in the productivity distribution. Finally, the cumulative hiring probability is updated based on the vacancy postings and matching rates.

Second Layer: Within-Period Equilibrium. This layer iterates on aggregate variables to find the within-period equilibrium. It starts with initial guesses for total vacancies $\{V_s\}$, aggregate output Y, and matching rates $\{\lambda_{U,s}, \lambda_{E,s}, q_s\}$. The sequential firm optimization (innermost layer) generates firm-level policies and the wage distribution $F_s(w)$ for each skill type. Firm entry decisions are determined by comparing expected

operating profits to stochastic fixed costs drawn from origin-specific distributions. This yields endogenous masses of active domestic and foreign firms at each productivity level. Finally, the aggregate variables are recalculated: total vacancies from Equation 18, output using Equation 17, and matching rates from the aggregate matching function in Equation 10. The iteration continues until all aggregate variables converge.

Third Layer: Dynamic Steady State. This layer iterates across periods to find the steady-state employment distribution that satisfies Equation 19. Given the within-period equilibrium, the end-of-period employment for each skill type is determined by aggregating firm-level employment weighted by the active firm mass as in Equation 15. The separation shocks are then applied according to the law of motion in Equation 13: workers face exogenous separation at rate δ_s and endogenous job-to-job transitions at rate $\lambda_{E,s}(1 - F_s(w))$, where the probability of poaching depends on the equilibrium wage distribution. Workers who separate transition to the informal sector, while new matches are formed according to the matching function, creating flows between informal and formal employment. The process repeats until the employment distribution stabilizes, with convergence assessed by the condition that $N_{s,t} - N_{s,t-1} = 0$ and $I_{s,t} - I_{s,t-1} = 0$ for all skill types.

Outermost Layer: SMM Estimation. The structural parameters are estimated by minimizing the weighted sum of squared percentage deviations between model moments and data targets. The algorithm searches over the parameter space $\{\mu_f, \sigma_f, \mu_d, \sigma_d, \alpha_\theta, \gamma, \phi_1, \phi_2, \{\delta_s\}\}$ to match the moment conditions specified in Table 7. For each parameter vector, the three inner layers compute the steady-state equilibrium and calculate the twelve moments. The SMM optimization employs a standard quasi-Newtonian method.[29] The algorithm iterates until convergence to the parameter vector that best matches the empirical moments from the pre-liberalization Brazilian data.

5.3.2. Model Fit

The estimated parameter values can be found in Table 7. As expected, the average fixed costs of operation in Brazil for multinational firms are much larger than the corresponding costs for domestic firms. The variance is also significantly larger. The estimated productivity distribution is highly dispersed, in line with the relatively high firm size dispersion in the data.[30] The vacancy convexity parameter is well within

[29] In particular, I employ an L-BFGS optimization algorithm with finite differences, using parameter transformations (e.g. logs) to ensure parameters remain within economically meaningful bounds throughout the search process.

[30] Note that the Pareto distribution is bounded from above and thus values of the alpha parameter below 1 still have finite mean.

usual literature bounds and the estimated separation rates (of approximately 8%) while high compared with developed countries are in the same order of magnitude as those found in other developing countries with high informality (e.g. Samaniego de la Parra and Fernández Bujanda, 2024 in Mexico)

Table 8 presents the model's performance in matching the empirical targets from the 1994 Brazilian data. The structural model successfully replicates all twelve targeted moments. The model matches the MNC employment share of 2.3%, capturing the limited pre-liberalization presence of multinational firms in the Brazilian labor market. The model also captures the stark size differences between domestic and foreign firms, with median employment of 12 and 89 workers respectively, reflecting the selection of large, productive firms into multinational production. The positive relationship between firm size and skill intensity observed in the data also emerges, as larger firms hire relatively more college graduates and fewer individuals with middle school or less.

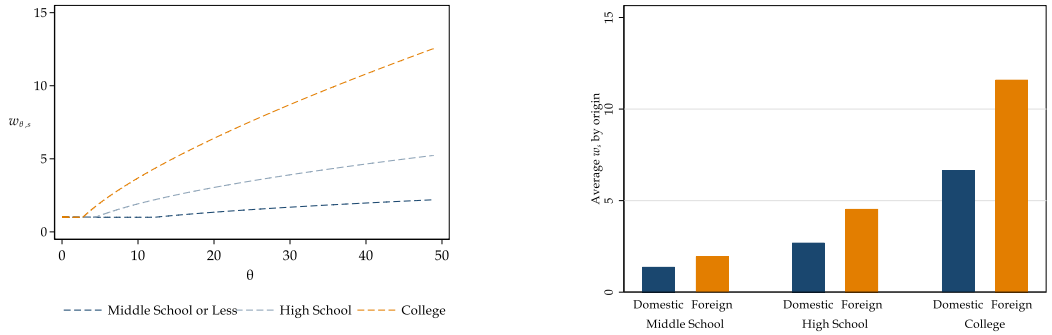
Table 8: Model Fit: Matching Empirical Targets

Moment	**Data Target**	**Model**
MNE Employment Share	0.024	0.024
Skill-Size Slope - College	0.026	0.026
Skill-Size Slope - Middle School	-0.028	-0.028
Informality Rate - Middle School	0.652	0.655
Informality Rate - High School	0.546	0.548
Informality Rate - College	0.406	0.406
Firm Size Ratio (P75/P25)	2.823	2.824
Large Firm Empl. Share ($N \geq 50$)	0.648	0.658
Median Firm Size - Domestic	12.00	12.04
Median Firm Size - MNE	89.00	89.13
Small Firm Empl. Share ($N \leq 10$, Dom.)	0.082	0.084
Small Firm Empl. Share ($N \leq 10$, MNE)	0.002	0.002

Figure 4a illustrates the equilibrium wage schedules across the productivity distribution for each skill type. The model generates upward-sloping wage profiles, consistent with the job ladder mechanism where more productive firms pay higher wages to attract and retain workers. The wage differential between skill types widens with firm productivity, reflecting the complementarity between firm productivity and worker skills embedded in the production function. Lower productivity firms are bounded by the informality wage.

Figure 4b presents the model-implied wage premia for multinational firms relative to domestic firms within each skill category. The model generates positive MNE wage premia for all skill types, with the premium increasing in skill level. These premia arise endogenously from the selection of high-productivity firms into multinational status

Figure 4: Model Estimates: Matching Key Empirical Patterns



(a) Wages by Productivity

(b) MNE Wage Premia

and their position at the top of the job ladder, where they must offer competitive wages to poach workers from domestic firms.

5.4. *Quantification of the FDI Liberalization*

In this section I use the model calibrated and estimated for the 1994 Brazilian economy to quantify the labor market effects of Brazil's 1995 FDI liberalization. I thus simulate the model's response to a reduction in multinational firms' average fixed costs of operation (μ_f) until the MNE employment share increases from its pre-liberalization level to the observed post-liberalization level of 4.6%.

Table 9: Labor Market Effects of the FDI Liberalization

Outcome	Pre-Liberalization	Post-Liberalization	% Change
MNE Employment Share	2.35%	4.62%	+92.7%
High School Wage Premium	1.971	1.977	+0.29%
College Wage Premium	4.881	5.032	+3.09%
Mass of Domestic Firms	0.992	0.988	-0.4%
Domestic Median Firm Size	12.0	11.7	-2.5%
Middle School Informality Rate	65.33%	65.56%	+0.35%
High School Informality Rate	54.87%	54.56%	-0.57%
College Informality Rate	40.64%	40.19%	-1.11%

Table 9 presents the model's predictions for key labor market outcomes. The liberalization generates heterogeneous effects across skill groups, with high-skilled workers benefiting disproportionately. The college wage premium increases by 3.09%, while the high school wage premium rises by only 0.29%. This differential impact reflects the skill-biased nature of multinational production and the stronger competition for skilled workers as MNEs expand.

The expansion of multinational firms creates competitive pressure on domestic firms through both product and labor markets. In the product market, the entry of highly productive MNEs intensifies competition under monopolistic competition, reducing the market share and profitability of less productive domestic firms. This leads to a 0.4% decrease in the mass of active domestic firms and a 2.5% reduction in median domestic firm size, as marginal domestic producers exit and surviving firms operate at smaller scales. The reallocation is reinforced through labor market channels, as MNEs attract workers—particularly skilled workers—by offering higher wages along the job ladder, further constraining domestic firms' ability to retain and expand their workforce.

The model predicts heterogeneous effects on informality rates: informality increases among low-skilled workers and decreases among skilled workers. This reflects a key distributional consequence of FDI liberalization: as skill-intensive MNEs expand, they absorb relatively fewer low-skilled workers while simultaneously displacing domestic firms that traditionally employ this workforce. The shrinking of the domestic formal sector thus pushes some low-skilled workers into informality.

6. Concluding Remarks

This paper documents the impact of a large-scale multinational firm entry shock on labor market outcomes. By exploiting a panel of 3 decades of employer–employee records and firm-level FDI data, I document that the removal of discriminatory barriers triggered a significant surge in multinational entry employment. This reform not only doubled the share of workers employed by multinationals over the subsequent decade, but also induced a reallocation of labor along skill lines—with college-educated workers enjoying substantial wage premiums, while lower-skilled workers in domestic firms faced modest wage declines and increased probability to be laidoff and move towards informality.

This study contributes to a broader debate on the trade-offs inherent in policies designed to attract multinational corporations. Although the entry of multinational firms can generate high-quality jobs and lead to productivity gains, the benefits are unevenly distributed, leading to amplified wage differentials and negative spillovers for lower-skill segments of the workforce.

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Appendix A.1: Supermodularity conditions

Using the firm level demand in Equation 8 and the production technology in Equation 11, we can write the revenue function as follows:

$$R = A\theta_f^{\frac{\sigma-1}{\sigma}} \left(\sum_{s \in S} a_{f,s}(\theta_f)^{\frac{1}{\eta}} \, l_{f,s}^{1-\frac{1}{\eta}} \right)^{\frac{\eta(\sigma-1)}{\sigma(\eta-1)}} \tag{.1}$$

where $A = X^{\frac{-1}{\sigma}} P^{\frac{1-\sigma}{\sigma}}$ is a market-level constant.

Supermodularity implies that the cross-derivatives of the revenue function with respect to any two labor inputs ($R_{l_s,l_{s'}}$) and of any labor input and productivity ($R_{l_s,\theta}$) must all be positive.

The first-order derivative of R_f with respect to $l_{f,s}$ is given by:

$$R_{l_s} = A \, \frac{\sigma-1}{\sigma} \, \theta_f^{\frac{\sigma-1}{\sigma}} \, a_{f,s}(\theta_f)^{\frac{1}{\eta}} \, l_{f,s}^{-\frac{1}{\eta}} \, \mathcal{L}^{\frac{\sigma-\eta}{\sigma\eta-\sigma}}. \tag{.2}$$

where $\mathcal{L}$ refers to $\sum_{s \in S} a_{f,s}(\theta_f)^{\frac{1}{\eta}} \, l_{f,s}^{1-\frac{1}{\eta}}$.

The cross-derivatives are thus:

$$R_{l_s,l_{s'}} = A \, \frac{(\sigma-1)(\sigma-\eta)}{\sigma^2 \, \eta} \, \theta_f^{\frac{\sigma-1}{\sigma}} \, a_{f,s}^{\frac{1}{\eta}} \, a_{f,s'}^{\frac{1}{\eta}} \, l_{f,s}^{-\frac{1}{\eta}} \, l_{f,s'}^{-\frac{1}{\eta}} \, \mathcal{L}^{\frac{2\sigma-\eta-\sigma\eta}{\sigma\eta-\sigma}}. \tag{.3}$$

$$R_{l_s,\theta_f} = A \, \frac{\sigma-1}{\sigma} \, l_{f,s}^{-\frac{1}{\eta}} \Big[\left(\tfrac{\sigma-1}{\sigma} \right) \theta_f^{\frac{\sigma-1}{\sigma}-1} \, a_{f,s}(\theta_f)^{\frac{1}{\eta}} \, \mathcal{L}^{\frac{\sigma-\eta}{\sigma\eta-\sigma}} \tag{.4}$$

$$+ \; \theta_f^{\frac{\sigma-1}{\sigma}} \, \frac{1}{\eta} \, a_{f,s}(\theta_f)^{\frac{1}{\eta}-1} \, \frac{d\, a_{f,s}(\theta_f)}{d\theta_f} \, \mathcal{L}^{\frac{\sigma-\eta}{\sigma\eta-\sigma}} \tag{.5}$$

$$+ \; \theta_f^{\frac{\sigma-1}{\sigma}} \, a_{f,s}(\theta_f)^{\frac{1}{\eta}} \left(\tfrac{\sigma-\eta}{\sigma\eta-\sigma} \right) \mathcal{L}^{\frac{\sigma-\eta}{\sigma\eta-\sigma}-1} \, \frac{d\,\mathcal{L}}{d\theta_f} \Big] \tag{.6}$$

where

$$\mathcal{L} \; = \; \sum_{s' \in S} a_{f,s'}(\theta_f)^{\frac{1}{\eta}} \, l_{f,s'}^{1-\frac{1}{\eta}}, \quad \text{and} \quad \frac{d\,\mathcal{L}}{d\theta_f} \; = \; \sum_{s' \in S} \frac{1}{\eta} \, a_{f,s'}(\theta_f)^{\frac{1}{\eta}-1} \, \frac{d\, a_{f,s'}(\theta_f)}{d\theta_f} \, l_{f,s'}^{1-\frac{1}{\eta}}. \tag{.7}$$

The sign of $R_{l_s,l_{s'}}$ exclusively on $(\sigma-\eta)$ and thus $R_{l_s,l_{s'}} > 0$ if $(\sigma-\eta) > 0$, giving the condition in Equation 20. Finally, the sign of $R_{l_s,\theta}$ also depends on the derivative $\frac{da_s(\theta)}{d\theta}$ for all $s \in S$, giving the condition in Equation 21.

Appendix A.2: Equilibrium Wage

This appendix details the derivation of the wage equation for a worker of skill s in a firm with productivity θ, as presented in Section 4. The model assumes a frictional labor market where firms post wages to attract workers, and workers can also opt for an informal sector earning b_s. The derivation relies on the strict monotonicity of wages with respect to productivity.

A firm with productivity θ chooses its wage w_s for skill s to maximize its profits. The profit function Π for the firm, considering its operations related to skill s (while holding other inputs constant for this partial derivation), can be expressed as:

$$\Pi(\theta, w_s) = R(\theta, \{l_k(w_k)\}_{k=1}^{S}) - \sum_{k=1}^{S} w_k l_k(w_k) - f_c \tag{.8}$$

where $R(\theta, \{l_k(w_k)\}_{k=1}^{S})$ is the firm's revenue, $l_k(w_k)$ is the employment of skill type k at wage w_k, and S is the total number of skill types.

The first-order condition (FOC) for the optimal wage w_s for skill s is obtained by differentiating the profit function with respect to w_s and setting it to zero:

$$\frac{\partial \Pi}{\partial w_s} = \frac{\partial R(\theta, \{l_k\})}{\partial l_s} \frac{dl_s}{dw_s} - l_s(w_s) - w_s \frac{dl_s}{dw_s} = 0 \tag{.9}$$

Rearranging Equation (.9), we get:

$$\left(\frac{\partial R}{\partial l_s} - w_s \right) \frac{dl_s}{dw_s} = l_s(w_s) \tag{.10}$$

Given Assumption 4 (wages $w_s(\theta)$ are strictly increasing in θ), we can use the chain rule for derivatives: $l_s'(\theta) = \frac{dl_s}{d\theta} = \frac{dl_s}{dw_s} \frac{dw_s}{d\theta}$. Let $w_s'(\theta) = \frac{dw_s}{d\theta}$. Thus, we can express $\frac{dl_s}{dw_s}$ as:

$$\frac{dl_s}{dw_s} = \frac{l_s'(\theta)}{w_s'(\theta)} \tag{.11}$$

Substitute this expression back into the rearranged FOC (Equation (.10)):

$$\left(\frac{\partial R(\theta, \{l_k(\theta)\})}{\partial l_s} - w_s(\theta) \right) \frac{l_s'(\theta)}{w_s'(\theta)} = l_s(\theta) \tag{.12}$$

Multiply by $w_s'(\theta)$ and rearrange the terms:

$$l_s(\theta) w_s'(\theta) = \left(\frac{\partial R(\theta, \{l_k(\theta)\})}{\partial l_s} - w_s(\theta) \right) l_s'(\theta) \tag{.13}$$

$$l_s(\theta) w_s'(\theta) + w_s(\theta) l_s'(\theta) = \frac{\partial R(\theta, \{l_k(\theta)\})}{\partial l_s} l_s'(\theta) \tag{.14}$$

The left-hand side of Equation (.14) is the derivative of the product $l_s(\theta) w_s(\theta)$ with

respect to θ:

$$\frac{d}{d\theta}(l_s(\theta)w_s(\theta)) = \frac{\partial R(\theta, \{l_k(\theta)\})}{\partial l_s} l_s'(\theta) \tag{.15}$$

Now, we integrate this ordinary differential equation with respect to productivity. Let $\tilde{\theta}$ be the variable of integration, and integrate from the productivity of the least productive formal firm, $\underline{\theta}$, to a generic productivity level θ:

$$\int_{\underline{\theta}}^{\theta} \frac{d}{d\tilde{\theta}}(l_s(\tilde{\theta})w_s(\tilde{\theta}))d\tilde{\theta} = \int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, \{l_k(\tilde{\theta})\})}{\partial l_s} l_s'(\tilde{\theta})d\tilde{\theta} \tag{.16}$$

Applying the fundamental theorem of calculus to the left side yields:

$$l_s(\theta)w_s(\theta) - l_s(\underline{\theta})w_s(\underline{\theta}) = \int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, \{l_k(\tilde{\theta})\})}{\partial l_s} l_s'(\tilde{\theta})d\tilde{\theta} \tag{.17}$$

Solving for $w_s(\theta)$:

$$w_s(\theta) = \frac{l_s(\underline{\theta})}{l_s(\theta)} w_s(\underline{\theta}) + \frac{1}{l_s(\theta)} \int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, \{l_k(\tilde{\theta})\})}{\partial l_s} l_s'(\tilde{\theta})d\tilde{\theta} \tag{.18}$$

Finally, using Assumption 5, that the wage at the least productive firm $\underline{\theta}$ is the informality wage b_s, i.e., $w_s(\underline{\theta}) = b_s$:

$$w_s(\theta) = b_s \frac{l_s(\underline{\theta})}{l_s(\theta)} + \int_{\underline{\theta}}^{\theta} \frac{\partial R(\tilde{\theta}, \{l_s(\tilde{\theta})\})}{\partial l_s} \frac{l_s'(\tilde{\theta})}{l_s(\theta)} d\tilde{\theta} \tag{.19}$$

Appendix B. The FDI Liberalization: Additional Context

Figure B1. Constraining Legislation and Amendment

Sector	Restrictive Legislation	Amending Legislation	Date of Amendment
Barriers Across All Sectors			
All Sectors – Main	Article 171 (C)	6th Amendment	16th August 1995
All Sectors – Public Procurement	Article 171 (C)	6th Amendment	16th August 1995
All Sectors – Tax Treatment	Decreto-Lei 401 Lei 4.131/62	Lei 9.249	26th December 1995
All Sectors – Royalties and Technology Acq.	Lei 5.772/71	Lei 9.279	14th May 1996
All Sectors – Public Loans and Subsidies	Lei 4.131/62 Agency Bylaws	6th Amendment Decreto 2.123	16th August 1995 15th January 1997
Sector-Specific Entry Barriers			
Construction and Public Infrastructure	Decreto 94.002	Lei 8.987	13th February 1995
Energy and Mining	Article 176 (C)	6th Amendment	16th August 1995
Transportation	Article 178 (C)	7th Amendment	16th August 1995
Information and Telecommunication Services	Articles 21 (C) Law 8.248/91	8th Amendment	16th August 1995
Professional Services	Decreto 66.717 Article 199 (C)	6th Amendment	16th August 1995
Oil and Gas	Article 177 (C)	9th Amendment Lei 9.478	10th November 1995
Finance and Insurance	Article 192 (C) Decreto 97.593	Executive Order (EM/311) 13th Amendment Decreto 2.123	3rd November 1995 22nd August 1996 15th January 1997
Media	Article 222 (C)	Not Amended	Not Amended

The table above shows the restrictive FDI regulation before the liberalization, the corresponding amending legislation dropping the restrictions and the date of amendment. The top panel indicates the barriers across all sectors, whereas the bottom panel indicates sector-specific entry restrictions. Sources: Own elaboration based on data from Constituição da República Federativa do Brasil de 1988, Baumann (1998), Corrêa (2007), OECD (1998) and BNDES (2002).

Article 171 of the 1988 Brazilian Constitution:

"Article 171. It is considered:

I - a Brazilian company, one that is organized under Brazilian laws and has its headoffice and management in Brazil;

II - a Brazilian company of domestic capital, one whose effective control is directly or indirectly held permanently either by individuals resident and domiciled in Brazil or by domestic public entities, the effective control of the company being understood as the ownership of the majority of its voting capital and de facto and legal exercise of the decision-making power to manage its activities.

Paragraph 1 - The law may, with regard to a Brazilian company of domestic capital:

I - grant special temporary protection and benefits for the development of activities deemed strategic for the national defense or vital to the development of the country;

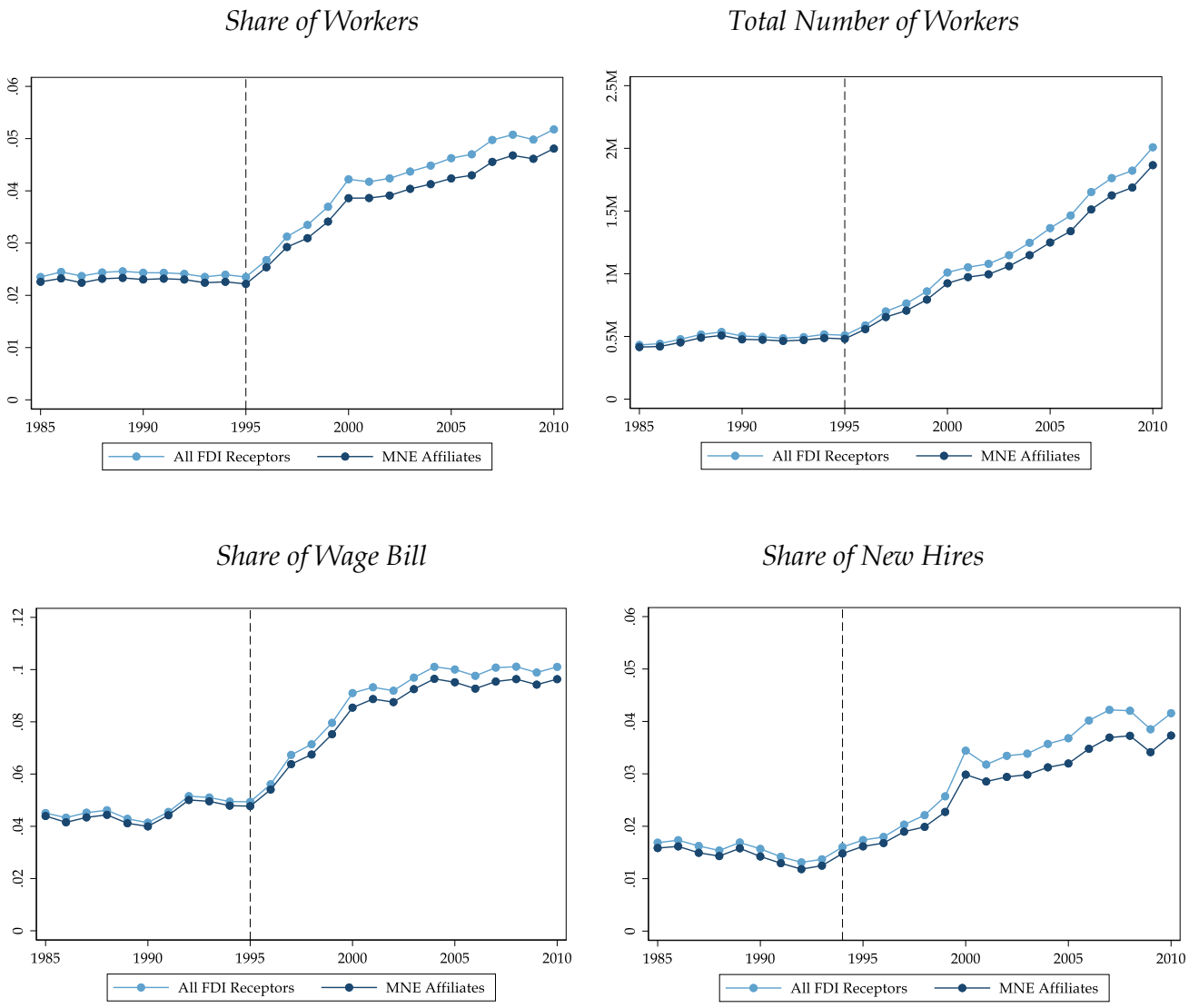
II - establish, whenever it deems a sector vital to national technological development, the following conditions and requisites, among others: a) the requirement that the control mentioned in item II of the caption be extended to the company's technological activities this being understood as de facto and legal exercise of the decision-making power to develop or absorb technology; b) percentages of capital participation by individuals domiciled and resident in Brazil or by domestic public entities.

Paragraph 2 - In the procurement of goods and services, the Government shall give preferential treatment to Brazilian companies of domestic capital, as established by law."

Source: Constituição da República Federativa do Brasil de 1988. English translation by the Political Database of the Americas (2008).

Appendix C. Descriptive Statistics

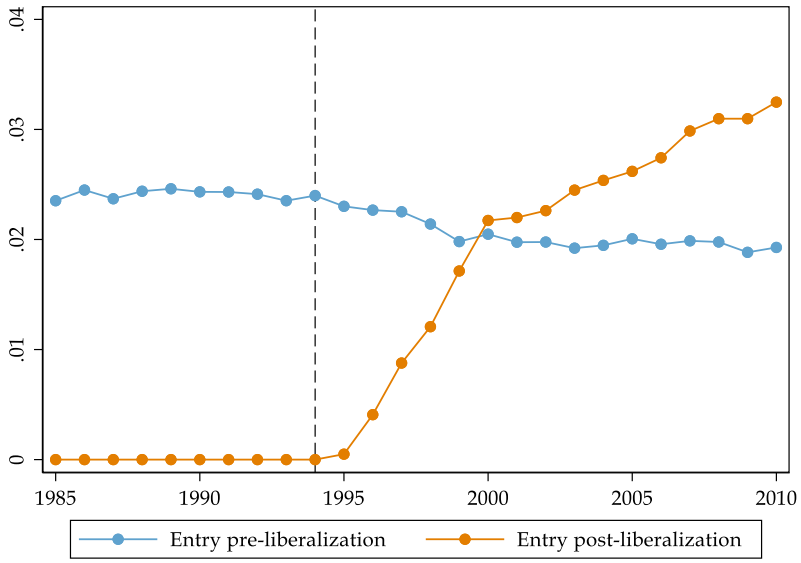
Figure C1. Evolution of Workers in MNCs



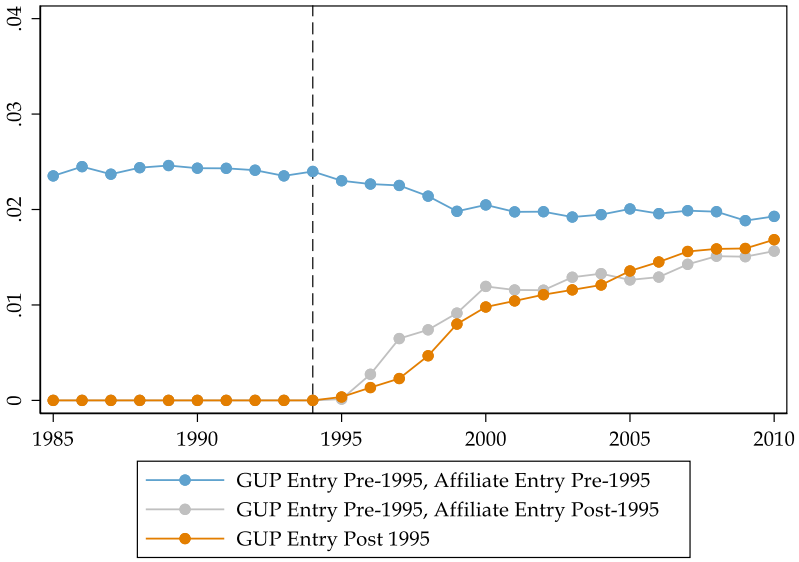
Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C2. Share of Workers in MNCs – By Margin of Expansion

a) Existing vs. new establishments

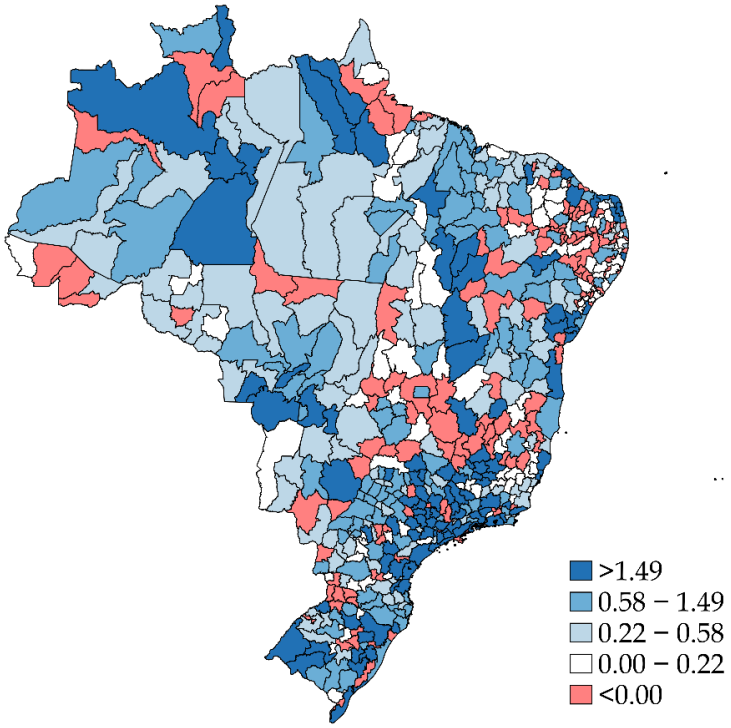


b) Existing vs. new establishments and GUP prior presence



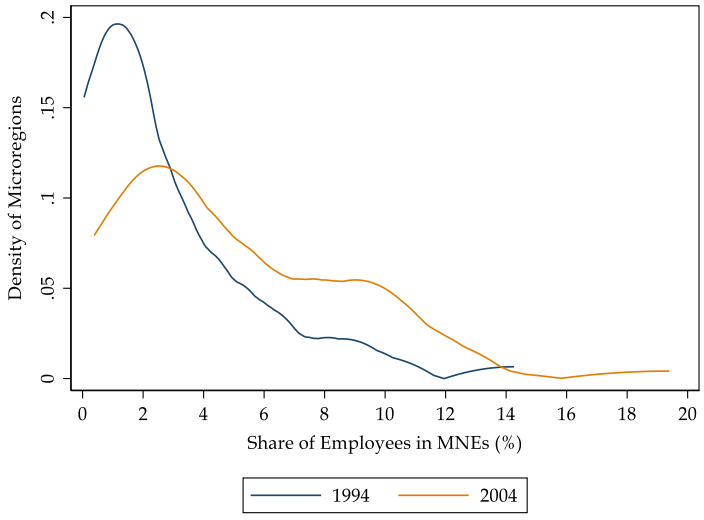
Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C3. Changes in the Share of Workers in MNC - By Microregion



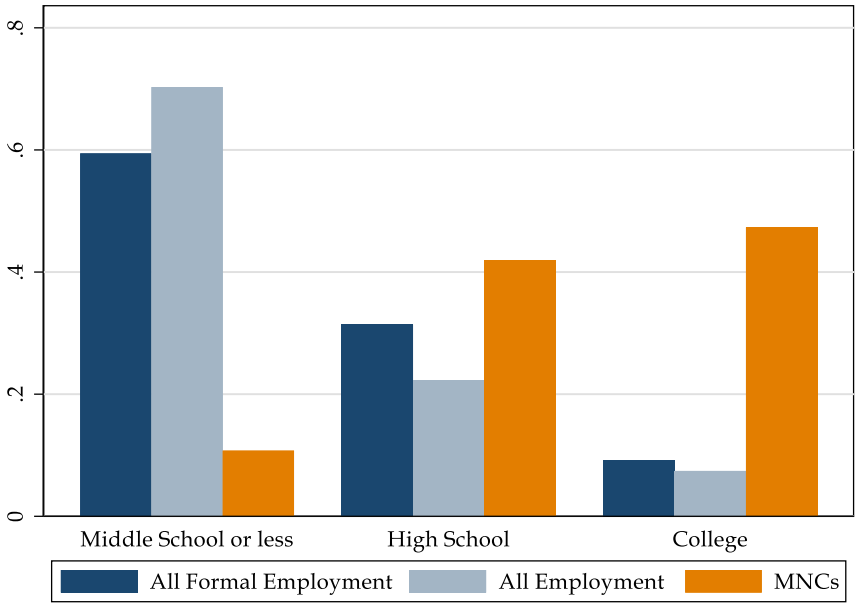
Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C4. Distribution of the Share of Workers in MNC - By Microregion



Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

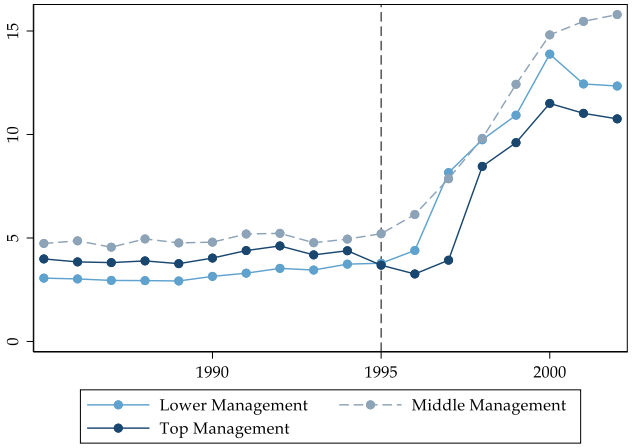
Figure C5. Composition of MNC Employment by Educational Attainment



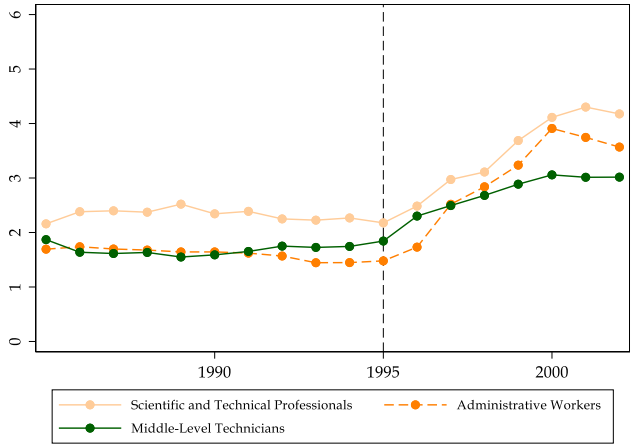
Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C6. Evolution of the Share of Workers in MNCs by Broad Occupation

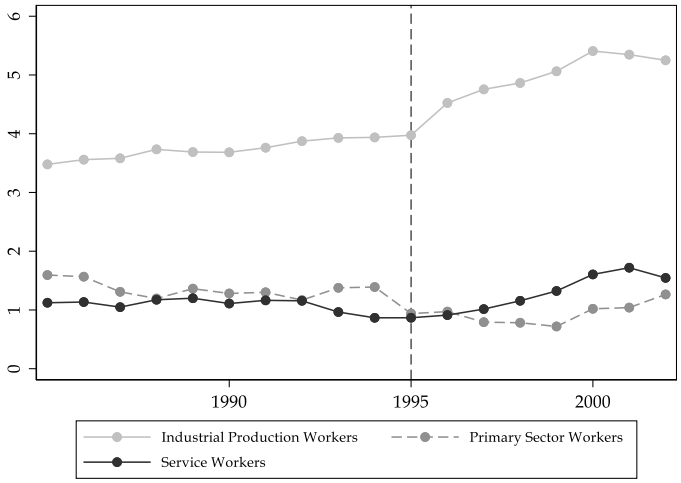
Managerial Occupations



Technical Occupations



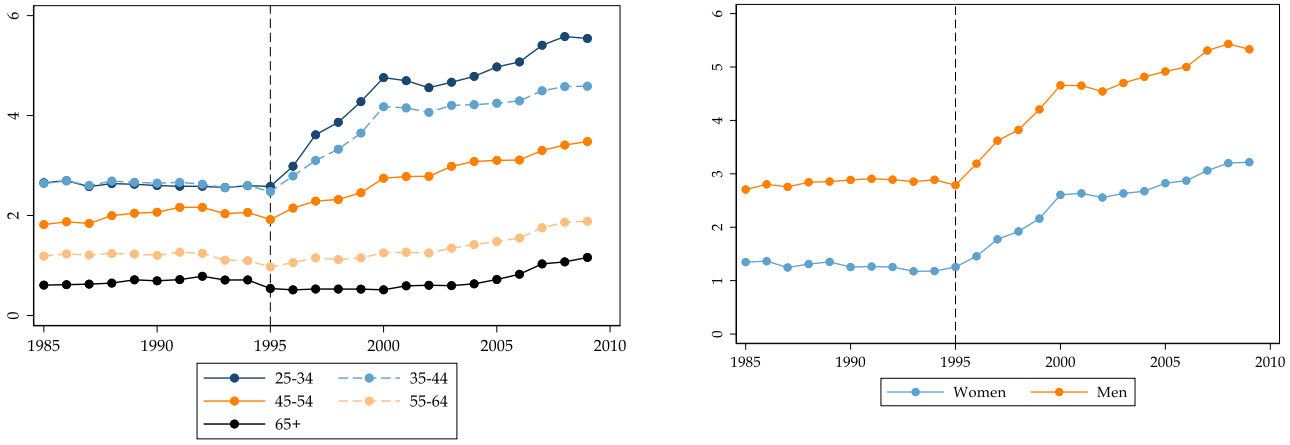
Operational and Production Occupations



Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

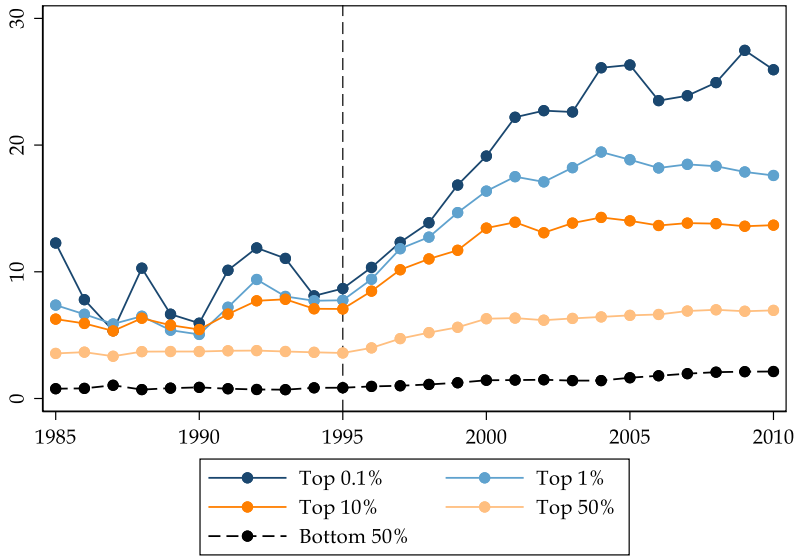
Figure C7. Evolution of the Share of Workers in MNCs by Worker Characteristics

By Age *By Gender*



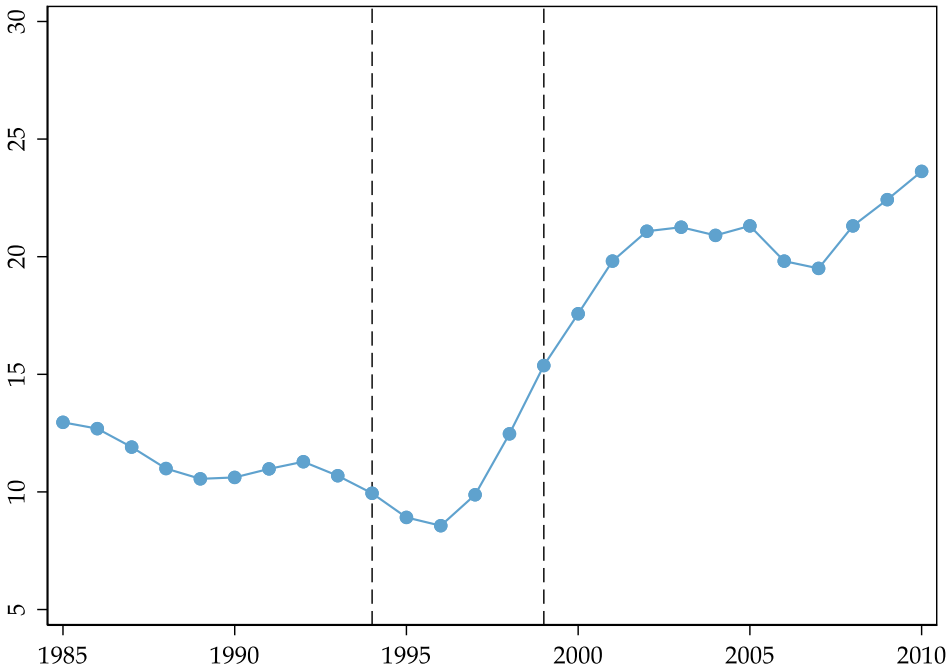
Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C8. Evolution of the Share of Workers in MNCs by Wage Percentile



Sources: Own elaboration with data from RAIS, BCB, DnB, and Refinitiv.

Figure C8. FDI Stock as Share of GDP in Brazil (1985-2010)



Source: UNCTAD FDI Statistics (2024). Note that, given the volatility of FDI series, the data has been smoothed using a five-year moving average.

Appendix D. Additional Evidence of the Direct Effect on MNC Workers

Figure D1. Direct Effect on MNC Workers
Additional Controls – Baseline

$Z_{i,f(sr),t}$ = *Average Monthly Wage*					
		(1)	(2)	(3)	(4)
$Works\ in\ MNC_{i,f(s,r),t}$		0.234***	0.225***	0.195***	0.197***
		(0.001)	(0.001)	(0.001)	(0.001)
Fixed Effects					
	Worker	Yes	Yes	Yes	Yes
	Sector-Microregion-Year	Yes	Yes	Yes	Yes
	Occupation	No	Yes	Yes	Yes
Additional Controls:					
	Firm Tenure, Experience	No	No	Yes	Yes
	Contract Characteristics	No	No	No	Yes
Observations		30,181,966	30,181,966	30,181,966	30,181,966

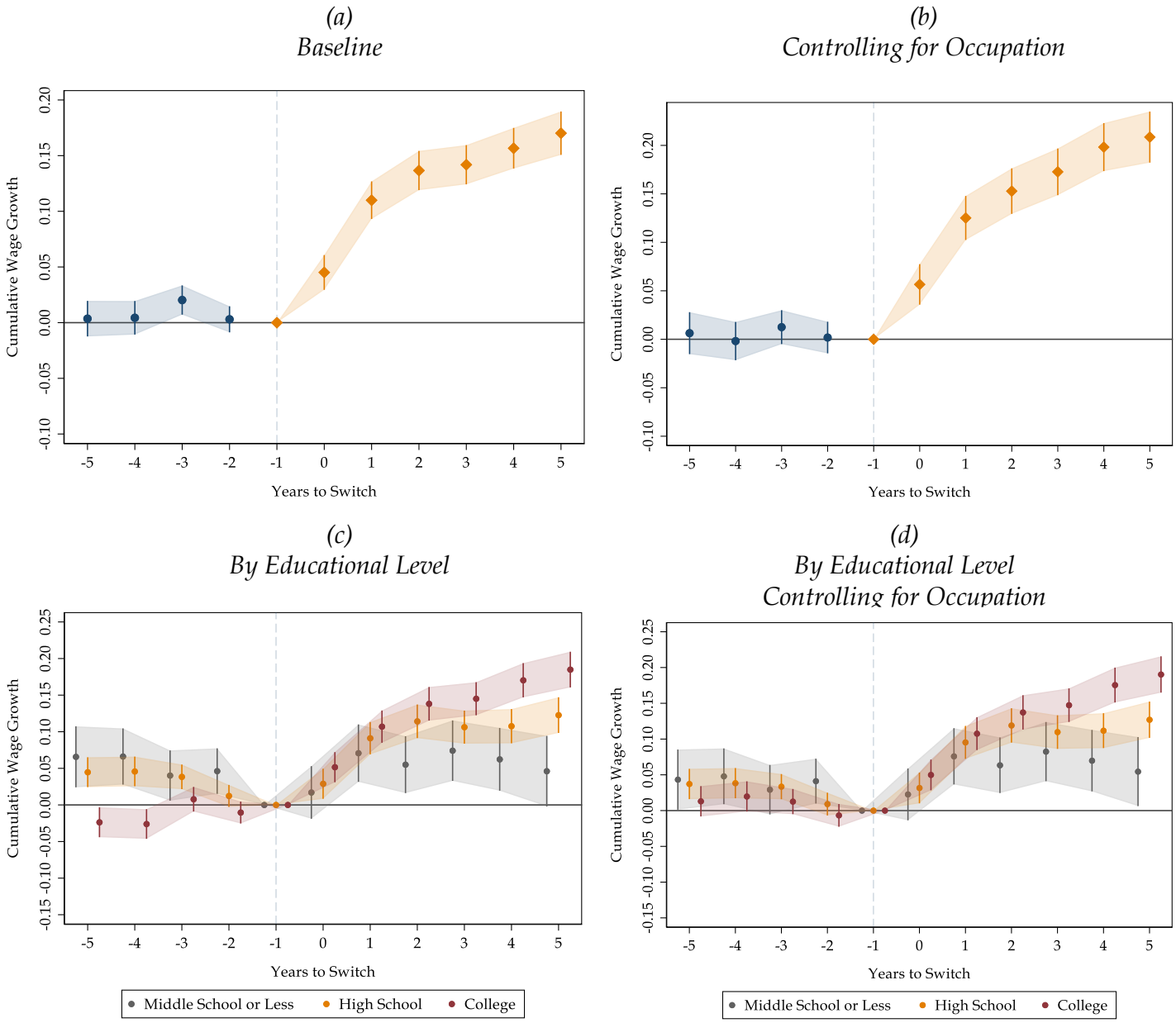
This table shows the results from estimating variants of Equation (2). Column 1 adds sector-microregion-year fixed effects, Column 2 adds occupation fixed effects, Column 3 controls for a third-degree polynomial of firm tenure and accumulated experience in formal employment and Column 4 adds as covariates binary variable that take value one if the worker is part-time employed, is a temporary worker or has a fixed-term contract.

Figure D2. Direct Effect on MNC Workers
Additional Controls – By Educational Attainment

$Z_{i,f(sr),t}$ = *Average Monthly Wage*					
		(1)	(2)	(3)	(4)
$Works\ in\ MNC_{i,f(s,r),t}\ x\ College_{i,t}$		0.352***	0.334***	0.301***	0.303***
		(0.001)	(0.001)	(0.001)	(0.001)
$Works\ in\ MNC_{i,f(s,r),t}\ x\ HS_{i,t}$		0.199***	0.189***	0.161***	0.162***
		(0.001)	(0.001)	(0.001)	(0.001)
$Works\ in\ MNC_{i,f(s,r),t}\ x\ MS_{i,t}$		0.165***	0.162***	0.135***	0.138***
		(0.001)	(0.001)	(0.001)	(0.001)
Fixed Effects					
	Worker	Yes	Yes	Yes	Yes
	Sector-Microregion-Year	Yes	Yes	Yes	Yes
	Occupation	No	Yes	Yes	Yes
Additional Controls:					
	Firm Tenure, Experience	No	No	Yes	Yes
	Contract Characteristics	No	No	No	Yes
Observations		30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the binary variable that takes value one if a worker works for an MNC is interacted with indicators for its level of educational attainment. Column 1 adds sector-microregion-year fixed effects, Column 2 adds occupation fixed effects, Column 3 controls for a third-degree polynomial of firm tenure and accumulated experience in formal employment and Column 4 adds as covariates binary variable that take value one if the worker is part-time employed, is a temporary worker or has a fixed-term contract.

Figure D3. Direct Effect on MNC Workers
Post-Liberalization Switcher Design - Effect on Wages



This figures above shows the results from estimating variants of Equation (3) where dependent variable is the cumulative wage growth relative to t-1 and the independent variables are a series of leads and lags of a binary variable that takes value one if a worker moves from a domestic firm to a multinational company at time t. The control group is formed by all other switchers that stay for at least 3 years in a company before moving to another company and staying there for another three or more years. Figures (a) and (b) show the estimates for all workers, with the latter adding occupation fixed effects. Figure (c) and (d) show the estimates segmenting by educational attainment level, with the latter adding occupation fixed effects.

Figure D4. Direct Effect on MNC Workers
Heterogeneity by MNC Characteristics

$Z_{i,f(sr),t}$ = *Average Monthly Wage*	(1)	(2)	(3)	(4)
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Affiliates > 50_{f(s,r),t}$	0.256***			
	(0.002)			
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Affiliates\ 10-50_{f(s,r),t}$	0.181***			
	(0.002)			
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Affiliates < 10_{f(s,r),t}$	0.174***			
	(0.002)			
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Countries > 50_{f(s,r),t}$		0.291***		
		(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Countries 10-50_{f(s,r),t}$		0.221***		
		(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Countries < 10_{f(s,r),t}$		0.166***		
		(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}\ x\ High\ Income_{f(s,r)}$			0.230***	
			(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Middle\ and\ Low\ Income_{f(s,r)}$			0.189***	
			(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Intrarregional_{f(s,r)}$				0.210***
				(0.003)
$Works\ in\ MNC_{i,f(s,r),t}\ x\ Extraregional_{f(s,r)}$				0.226***
				(0.001)
Fixed Effects				
Sector-Microregion	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes
Observations	30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the binary variable that takes value one if a worker works for an MNC is interacted with different binary variables that describe MNC characteristics. Column 1 separates according to the global number of affiliates of the global ultimate parent of the multinational firm (less than 10, 10-50, more than 50). Column 2 separates according to the number of countries where the global ultimate parent is present (less than 10, 10-50, more than 50). Column 3 separates according to whether the global ultimate parent company is from a high-income country or a middle-income or low-income country. Column 4 separates according to whether the global ultimate parent company is headquartered in the same region as Brazil (Latin America) or in another region.

Figure D5. Direct Effect on MNC Workers
Heterogeneity by Sector

$Z_{i,f(sr),t}$ = *Average Monthly Wage*		(1)	(2)	(3)	(4)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Sectoral\ Restriction_{s.1994}$		0.189***			
		(0.001)			
$Works\ in\ MNC_{i,f(s,r),t}$ x $No\ Sectoral\ Restriction_{s,1994}$		0.237***			
		(0.001)			
$Works\ in\ MNC_{i,f(s,r),t}$ x $Tradable_s$			0.234***		
			(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}$ x $Non-Tradable_s$			0.217***		
			(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ \%\ Innovating\ Firms_s$				0.227***	
				(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $Med\ \%\ Innovating\ Firms_s$				0.227***	
				(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ \%\ Innovating\ Firms_s$				0.224***	
				(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ \%\ Firms\ with\ Patents_s$					0.227***
					(0.001)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Med\ \%\ Firms\ with\ Patents_s$					0.217***
					(0.001)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ \%\ Firms\ with\ Patents_s$					0.231***
					(0.001)
Fixed Effects					
	Sector-Microregion	Yes	Yes	Yes	Yes
	Sector-Year	Yes	Yes	Yes	Yes
	Microregion-Year	Yes	Yes	Yes	Yes
	Worker	Yes	Yes	Yes	Yes
Observations		30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the binary variable that takes value one if a worker works for an MNC is interacted with different binary variables that describe sector characteristics. Column 1 separates according to whether the sector had sector-specific FDI restrictions in 1994 or not. Column 2 separates between tradable (goods) and non-tradable sectors (services). Column 3 separates according to the share of innovating firms, based on data from the Brazilian Survey of Innovation (PINTEC). Column 4 separates according to the share of companies with patents, based on data from the Brazilian Survey of Innovation (PINTEC).

Figure D6. Direct Effect on MNC Workers
Heterogeneity by Occupation Characteristics

$Z_{i,f(sr),t}$ = *Average Monthly Wage*	(1)	(2)	(3)	(4)	(5)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Management_{i,f(s,r),t}$	0.450***				
	(0.003)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $Professional_{i,f(s,r),t}$	0.333***				
	(0.002)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $Technical_{i,f(s,r),t}$	0.261***				
	(0.002)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $Administrative\ Worker_{i,f(s,r),t}$	0.131***				
	(0.002)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $Service\ Worker_{i,f(s,r),t}$	0.146***				
	(0.002)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $Production\ Worker_{i,f(s,r),t}$	0.170***				
	(0.001)				
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ Cognitive\ Content_{i,f(s,r),t}$		0.273***			
		(0.001)			
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ Cognitive\ Content_{i,f(s,r),t}$		0.186***			
		(0.001)			
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ Routine\ Content_{i,f(s,r),t}$			0.231***		
			(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ Routine\ Content_{i,f(s,r),t}$			0.220***		
			(0.001)		
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ Manual\ Content_{i,f(s,r),t}$				0.219***	
				(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ Manual\ Content_{i,f(s,r),t}$				0.226***	
				(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $High\ Social\ Content_{i,f(s,r),t}$					0.272***
					(0.001)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Low\ Social\ Content_{i,f(s,r),t}$					0.192***
					(0.001)
Fixed Effects					
Sector-Microregion	Yes	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes	Yes
Observations	30,181,966	30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the binary variable that takes value one if a worker works for an MNC is interacted with different binary variables that describe occupation characteristics. Column 1 separates by broad occupational categories based on the 1-digit International Standard Classification of Occupations (ISCO) code. Column 2 separates between high cognitive and low cognitive content occupations based on the O-Net Classification. Column 3 separates between high routine and low routine content occupations based on the O-Net Classification. Column 4 separates between high manual and low manual content occupations based on the O-Net Classification. Column 5 separates between high social and low social content occupations based on the O-Net Classification. I use the data on the O-NET and CBO concordance from Sulzbach et al. (2022).

Figure D7. Direct Effect on MNC Workers
Heterogeneity by Worker Characteristics

$Z_{i,f(sr),t}$ = *Average Monthly Wage*		(1)	(2)
$Works\ in\ MNC_{i,f(s,r),t}$ x Men_i		0.238***	
		(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $Women_i$		0.192***	
		(0.001)	
$Works\ in\ MNC_{i,f(s,r),t}$ x $Age: Under\ 30_{\ i,t}$			0.175***
			(0.001)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Age: 30-45_{\ i,t}$			0.297***
			(0.001)
$Works\ in\ MNC_{i,f(s,r),t}$ x $Age: Above\ 45_{\ i,t}$			0.101***
			(0.002)
Fixed Effects			
	Sector-Microregion	Yes	Yes
	Sector-Year	Yes	Yes
	Microregion-Year	Yes	Yes
	Worker	Yes	Yes
Observations		30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the binary variable that takes value one if a worker works for an MNC is interacted with different binary variables that describe worker demographic characteristics. Column 1 separates according to the gender of the individual. Column 2 separates individuals according to their age group (under 30, 30-45, above 45).

Figure D8. Lifetime Effect on MNC Workers - Effect on Earnings

$Z_i =$	*Lifetime Earnings (ln)*	
	(1)	(2)
$1st\ Job\ at\ MNC_i$	0.414***	
	(0.007)	
$1st\ Job\ at\ MNC_i$ x College		0.498***
		(0.012)
$1st\ Job\ at\ MNC_i$ x HS		0.375***
		(0.010)
$1st\ Job\ at\ MNC_i$ x MS		0.310***
		(0.019)
Controls		
Education, Gender, Career Length	Yes	Yes
Observations	382,961	382,961

This table shows the results from estimating variants of Equation (4). The dependent variable refers to the lifetime earnings of an individual. The main independent variable is a binary indicator that takes value one if the individual's first full-time formal job was in a multinational firm, which in Column 2 is interacted with educational attainment categories (MS – incomplete high school or less, HS – complete high school, College – complete college studies) . I include as controls the educational attainment, gender and career length of the individual. The sample is restricted to the cohort of workers born between 1960 and 1985 with at least 15 years of data (as in, e.g., Guvenen et al, 2022 and Arellano-Bover, 2024).

Figure D9. Lifetime Effect on MNC Workers - Effect on Other Lifetime Outcomes

$Z_i =$ *Number of… in Lifetime*	*Employers*		*Sectors Worked*		*Years Out of Formal Employment*	
	(1)	(2)	(3)	(4)	(5)	(6)
$1st\ Job\ at\ MNC_i$	-0.326***		-0.083***		-0.846***	
	(0.029)		(0.025)		(0.031)	
$1st\ Job\ at\ MNC_i$ *x College*		-0.296***		-0.121***		-1.084***
		(0.043)		(0.038)		(0.043)
$1st\ Job\ at\ MNC_i$ *x HS*		-0.363***		-0.069*		-0.790***
		(0.044)		(0.037)		(0.046)
$1st\ Job\ at\ MNC_i$ *x MS*		-0.275***		-0.027		-0.287***
		(0.080)		(0.064)		(0.099)
Controls						
Education, Gender, Career Length	Yes	Yes	Yes	Yes	Yes	Yes
Observations	382,961	382,961	382,961	382,961	382,961	382,961

This table shows the results from estimating variants of Equation (4). The dependent variables are the number of employers, number of sectors of activity and number of years out of formal employment that individual i has in their lifetime. The main independent variable is a binary indicator that takes value one if the individual's first full-time formal job was in a multinational firm, which in Column 2 is interacted with educational attainment categories (MS – incomplete high school or less, HS – complete high school, College – complete college studies) . I include as controls the educational attainment, gender and career length of the individual. The sample is restricted to the cohort of workers born between 1960 and 1985 with at least 15 years of data (as in, e.g., Guvenen et al, 2022 and Arellano-Bover, 2024).

Appendix E. Additional Evidence of the Indirect Effect on Other Workers and Domestic Firms

Figure E1. Indirect Effect on Workers in Domestic Firms
Alternative proxies of FDI shock

$Z_{i,f(sr),t}$ = *Average Monthly Wage*	(1)	(2)	(3)	
$\boldsymbol{FDI\ Shock_{f(s,r),t} =}$:				
MNE Employment Share	-0.006***			
	(0.001)			
FDI Recipient Employment Share		-0.006***		
		(0.001)		
MNE Number Firms			-0.004**	
			(0.002)	
FDI Recipient Number Firms				-0.004**
				(0.002)
Fixed Effects				
Sector-Microregion	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes
Observations	30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) with different proxies for the indirect exposure to MNC entry. All measures refer to the difference in a given sector-region from the year before the FDI liberalization (1994) up to year t. Column 1 uses as a proxy of indirect MNC entry exposure the growth of the employment share in multinational corporations, Column 2 the growth of the employment share in all FDI receptors, Column 3 the number of multinational corporations openings and Column 4 the number of FDI receptor openings.

Figure E2. Indirect Effect on Workers in Domestic Firms
Alternative proxies of FDI shock – By Educational Attainment

$Z_{i,f(sr),t}$ = *Average Monthly Wage*	(1)	(2)	(3)	(4)
$\boldsymbol{FDI\ Shock_{f(s,r),t} = :}$				
MNE Employment Share x College	0.088***			
	(0.002)			
MNE Employment Share x HS	-0.006***			
	(0.002)			
MNE Employment Share x MS	-0.050***			
	(0.002)			
FDI Recipient Employment Share x College		0.101***		
		(0.002)		
FDI Recipient Employment Share x HS		-0.006***		
		(0.001)		
FDI Recipient Employment Share x MS		-0.054***		
		(0.002)		
MNE Number Firms x College			0.111***	
			(0.004)	
MNE Number Firms x HS			-0.002	
			(0.004)	
MNE Number Firms x MS			-0.053***	
			(0.003)	
FDI Recipient Number Firms x College				0.143***
				(0.004)
FDI Recipient Number Firms x HS				-0.005
				(0.004)
FDI Recipient Number Firms x MS				-0.066***
				(0.003)
Fixed Effects				
Sector-Microregion	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes
Observations	30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) with different proxies for the indirect exposure to MNC entry interacted with educational attainment binary variables (MS – no completed high school, HS – completed high school, College – college graduate). All measures refer to the difference in a given sector-region from the year before the FDI liberalization (1994) up to year t. Column 1 uses as a proxy of indirect MNC entry exposure the growth of the employment share in multinational corporations, Column 2 the growth of the employment share in all FDI receptors, Column 3 the number of multinational corporations openings and Column 4 the number of FDI receptor openings.

Figure E3. Indirect Effect on Workers in Domestic Firms
Sectors with Pre-Existing Barriers

$Z_{i,f(sr),t}$ = *Average Monthly Wage*		(1)	(2)
$FDI\ Shock_{f(s,r),t}$ *x Sector-Specific Restrictions*		-0.007***	
		(0.001)	
$FDI\ Shock_{f(s,r),t}$ *x No Sector-Specific Restrictions*		-0.005**	
		(0.002)	
$FDI\ Shock_{f(s,r),t}$ *x Sector-Specific Restrictions x College*			0.096***
			(0.004)
$FDI\ Shock_{f(s,r),t}$ *x Sector-Specific Restrictions x HS*			-0.009**
			(0.004)
$FDI\ Shock_{f(s,r),t}$ *x Sector-Specific Restrictions x MS*			-0.088***
			(0.003)
$FDI\ Shock_{f(s,r),t}$ *x No Sector-Specific Restrictions x College*			0.075***
			(0.003)
$FDI\ Shock_{f(s,r),t}$ *x No Sector-Specific Restrictions x HS*			-0.005**
			(0.002)
$FDI\ Shock_{f(s,r),t}$ *x No Sector-Specific Restrictions x MS*			-0.036***
			(0.002)
Fixed Effects			
	Sector-Microregion	Yes	Yes
	Sector-Year	Yes	Yes
	Microregion-Year	Yes	Yes
	Worker	Yes	Yes
	Observations	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the indirect MNC entry exposure proxy is interacted with a binary variable that takes value one if the sector of activity had sector-specific FDI restrictions in 1994. In Column (2), I further interact these variables with educational attainment categories.

Figure E4. Indirect Effect on Workers in Domestic Firms
Heterogeneity by Occupation Characteristics

$Z_{i,f(sr),t}$ = *Average Monthly Wage*	(1)	(2)	(3)	(4)	(5)
$FDI\ Shock_{f(s,r),t}\ x\ Management_{i,f(s,r),t}$	0.288***				
	(0.005)				
$FDI\ Shock_{f(s,r),t}\ x\ Professional_{i,f(s,r),t}$	0.187***				
	(0.004)				
$FDI\ Shock_{f(s,r),t}\ x\ Technical_{i,f(s,r),t}$	0.064***				
	(0.003)				
$FDI\ Shock_{f(s,r),t}\ x\ Administrative\ Worker_{i,f(s,r),t}$	-0.062***				
	(0.003)				
$FDI\ Shock_{f(s,r),t}\ x\ Service\ Worker_{i,f(s,r),t}$	-0.074***				
	(0.003)				
$FDI\ Shock_{f(s,r),t}\ x\ Production\ Worker_{i,f(s,r),t}$	-0.049***				
	(0.002)				
$FDI\ Shock_{f(s,r),t}\ x\ High\ Cognitive\ Content_{i,f(s,r),t}$		0.041***			
		(0.002)			
$FDI\ Shock_{f(s,r),t}\ x\ Low\ Cognitive\ Content_{i,f(s,r),t}$		-0.045***			
		(0.001)			
$FDI\ Shock_{f(s,r),t}\ x\ High\ Routine\ Content_{i,f(s,r),t}$			-0.011***		
			(0.002)		
$FDI\ Shock_{f(s,r),t}\ x\ Low\ Routine\ Content_{i,f(s,r),t}$			-0.001		
			(0.002)		
$FDI\ Shock_{f(s,r),t}\ x\ High\ Manual\ Content_{i,f(s,r),t}$				-0.046***	
				(0.002)	
$FDI\ Shock_{f(s,r),t}\ x\ Low\ Manual\ Content_{i,f(s,r),t}$				0.023***	
				(0.001)	
$FDI\ Shock_{f(s,r),t}\ x\ High\ Social\ Content_{i,f(s,r),t}$					0.038***
					(0.002)
$FDI\ Shock_{f(s,r),t}\ x\ Low\ Social\ Content_{i,f(s,r),t}$					-0.037***
					(0.001)
Fixed Effects					
Sector-Microregion	Yes	Yes	Yes	Yes	Yes
Sector-Year	Yes	Yes	Yes	Yes	Yes
Microregion-Year	Yes	Yes	Yes	Yes	Yes
Worker	Yes	Yes	Yes	Yes	Yes
Observations	30,181,966	30,181,966	30,181,966	30,181,966	30,181,966

This table shows the results from estimating variants of Equation (2) where the indirect MNC entry exposure proxy is interacted with different binary variables that describe occupation characteristics. Column 1 separates by broad occupational categories based on the 1-digit International Standard Classification of Occupations (ISCO) code. Column 2 separates between high cognitive and low cognitive content occupations based on the O-Net Classification. Column 3 separates between high routine and low routine content occupations based on the O-Net Classification. Column 4 separates between high manual and low manual content occupations based on the O-Net Classification. Column 5 separates between high social and low social content occupations based on the O-Net Classification. I use the data on the O-NET and CBO concordance from Sulzbach et al. (2022).

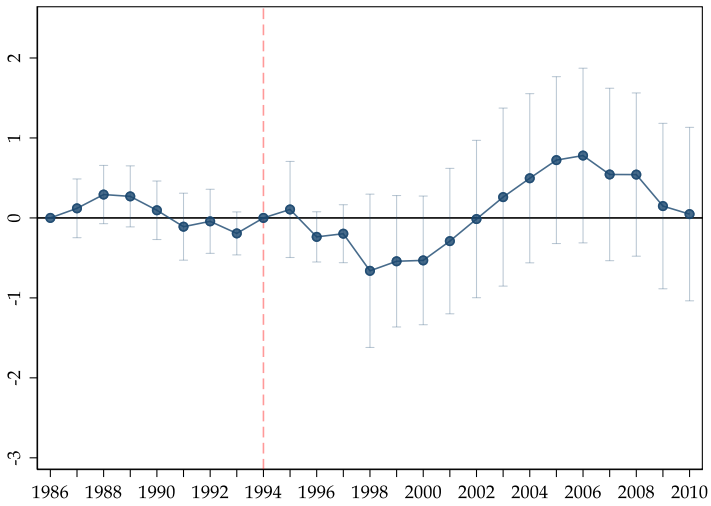
Figure E5. Indirect Effect on Workers in Domestic Firms
Heterogeneity by Worker Characteristics

$Z_{i,f(sr),t}$ = *Average Monthly Wage*			
		(1)	(2)
$FDI\ Shock_{f(s,r),t}\ x\ Men_i$		0.001	
		(0.001)	
$FDI\ Shock_{f(s,r),t}\ x\ Women_i$		-0.025***	
		(0.002)	
$FDI\ Shock_{f(s,r),t}\ x\ Age: Under\ 30\ _{i,t}$			-0.015***
			(0.002)
$FDI\ Shock_{f(s,r),t}\ x\ Age: 30-45\ _{i,t}$			0.065***
			(0.002)
$FDI\ Shock_{f(s,r),t}\ x\ Age: Above\ 45\ _{i,t}$			-0.181***
			(0.002)
Fixed Effects			
	Sector-Microregion	Yes	Yes
	Sector-Year	Yes	Yes
	Microregion-Year	Yes	Yes
	Worker	Yes	Yes
Observations		30,181,966	30,181,966

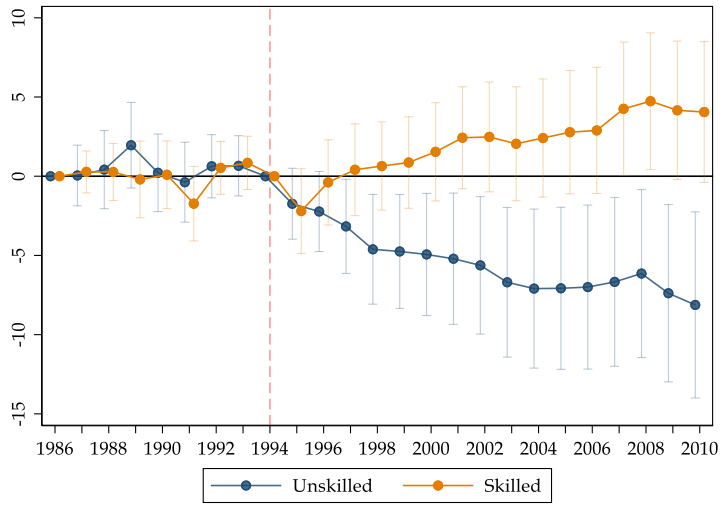
This table shows the results from estimating variants of Equation (2) where the indirect MNC entry exposure proxy is interacted with different binary variables that describe worker demographic characteristics. Column 1 separates according to the gender of the individual. Column 2 separates individuals according to their age group (under 30, 30-45, above 45).

Figure E6. Aggregate labor market effect

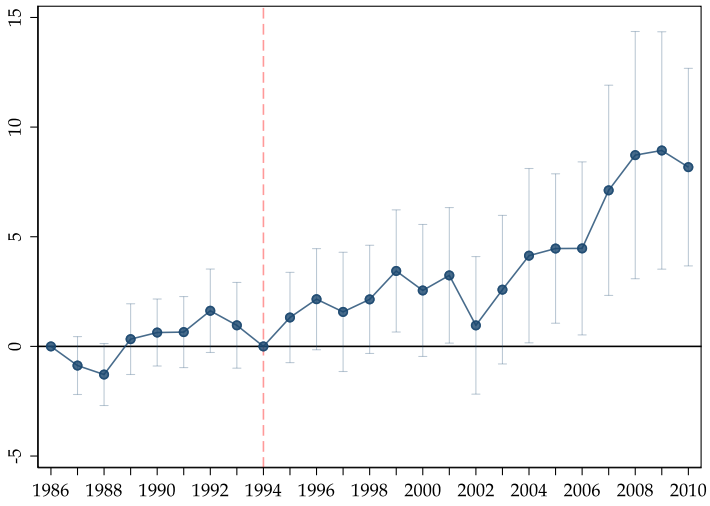
(a) Total Employment



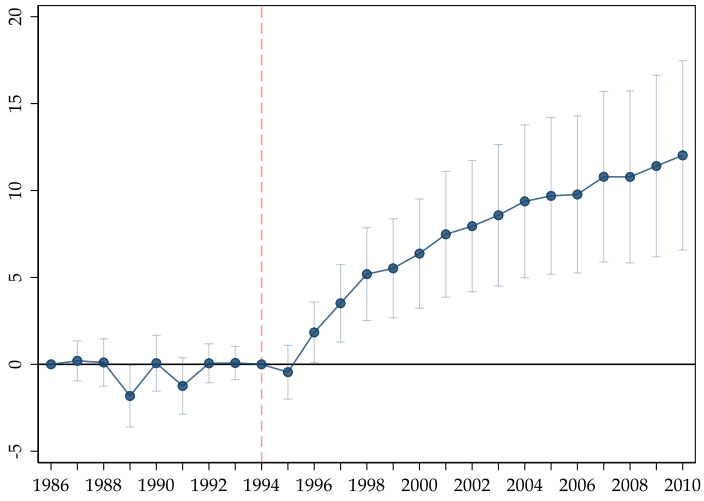
(b) Employment by Skill Level



(c) Ratio Wage Skilled to Wage Unskilled



(d) Ratio Skilled to Unskilled



This table shows the results from estimating variants of Equation (6). The independent variables all refer to the growth in microregion r between year t and 1994. Panel (a) shows the growth in total employment, Panel (b) the growth in total employment of skilled (college) and unskilled (high school or less) employment, Panel (c) the growth in the ratio of average wage for skilled and unskilled individuals and Panel (d) the growth in the ratio of skilled to unskilled employment. The main dependent variable is the total post-liberalization change in the MNC employment share from 1995 to 2010. The specifications include state fixed effects and are estimated year by year.

Figure E7. Margins of Adjustment

ΔZ_r		***Unskilled***			***Skilled***	
(in logs)	*Informality Rate*	*Employment Rate*	*Unemployment Rate*	*Informality Rate*	*Employment Rate*	*Unemployment Rate*
	(1)	(2)	(3)	(4)	(5)	(6)
Δmnc_r	1.702***	-0.235**	-0.211	-0.001	0.227	-0.197
	(0.581)	(0.094)	(0.171)	(0.873)	(0.403)	(0.166)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	452	452	452	452	452	452

This table shows the results from estimating a variant of Equation (6) using Demographic Census data from 1991 and 2010. The independent variables all refer to the growth in microregion r between 1991 and 2010. In Columns (1) and (4) the independent variable is the informality rate for unskilled (high school or less) and skilled (college graduates) individuals, in Columns (2) and (5) the employment rate for unskilled and skilled individuals and in Columns (3) and (6) the unemployment rate for unskilled and skilled individuals. The main dependent variable is the total post-liberalization change in the MNC employment share from 1995 to 2010. The specifications include state fixed effects.