

Employees or Entrepreneurs? Uncovering the *pejotização* phenomenon in Brazil

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Abstract

This paper examines the impact of the Individual Micro-Entrepreneur (MEI) program, introduced by the Brazilian government to reduce informality and increase microentrepreneurship among self-employed individuals. While the program has successfully decreased informality, it may have also created unintended consequences such as increasing the phenomenon of *pejotização*, whereby employers hire workers contractually as small enterprises in order to avoid labor taxes and regulatory costs. To investigate this phenomenon, two empirical approaches, namely a reduced-form and a structural framework, are utilized. The reduced-form uses a differences-in-differences design that combines heterogeneity in distance to 3G antennae with the start of online registration of MEIs in July 2009 in order to assess the impact of relaxing registration costs on entrepreneurship and labor supply decisions. Using this framework, I find evidence that areas closer to 3G antennae indeed have more MEIs after July 2009, while the number of traditional work contracts decreases. These results are equally consistent with an increase in entrepreneurship among individuals previously hired as workers or with a substitution away from standard labor contracts towards *pejotização*. To separate and quantify both mechanisms, I consider a structural approach. Specifically, I introduce a heterogeneous agent model that allows me to decompose these mechanisms and capture general equilibrium effects. The model

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allows individuals to choose to work for a wage, be a MEI operating as a worker (*pejotização*), a MEI microentrepreneur or own a standard formal sector firm. Upon estimating my model, I find that 53% of MEIs operate as workers. The aggregate effects of the MEI program on wages, productivity, labor demand, output, and welfare are then examined, and four counterfactual policies aiming at reducing *pejotização* are also considered. The results show that all counterfactual policies lead to an increase in welfare compared to the baseline economy, resulting in higher average productivity and output. The reduction of the tax burden on workers hiring is found to be the most effective policy in increasing welfare gains and raising wages, leading to a better allocation of workers and a reduction in illegal hiring. Finally, the study finds that *pejotização* acts as a partial insurance to entrepreneurial risk among self-employed individuals, in the sense that individuals have an option to work for a wage if their microbusiness is unprofitable. This “buffer” to entrepreneurial risk is very important: in a counterfactual scenario where *pejotização* is prohibited, microentrepreneurship also disappears. Finally, my results show that raising microentrepreneurship and increasing aggregate output may be conflicting goals, which casts doubt on standard justifications for microbusiness supporting programs.

1 Introduction

The imposition of high costs by bureaucracies on both employers and employees is a common topic of discussion in the field of economics (Bruhn, 2011; Kaplan et al., 2011; de Mel et al., 2013). To address this issue, governments often introduce measures to promote business development, reduce informality, and increase employment (Monteiro and Assunção, 2012; Fajnzylber et al., 2011; Alvarez et al., 2022). This paper contributes to this ongoing discussion by examining the Individual Micro-Entrepreneur (MEI) program, a measure introduced by the Brazilian government to help self-employed individuals to open a business online, free of charge¹. While the program aims to reduce informality (Rocha et al., 2018), it has also the potential to create perverse incentives.

Specifically, this paper explores a form of informality incentivized by the introduction of MEI, known as “Pejotização.” According to the Brazilian Minister of Labor and Employment, “The MEI is not the problem, as he owns the popcorn cart. However, if someone has ten carts and hires ten popcorn sellers as MEIs, they are employees, and what exists is a labor fraud...” (Folha de São Paulo, 2023). In order to evade taxation and costs associated with hiring employees through traditional work contracts, companies have an incentive to hire employees through MEI. Employers can avoid paying various taxes and can more easily replace their employees. Employees, on the other hand, tend to accept MEI work since it offers more flexible working hours and exempts them from paying income tax. However, they give up their labor rights and must pay all taxes associated with their businesses.

This study aims to investigate the aggregate effects of the Brazilian Microentrepreneur Individual (MEI) program on aggregate outcomes such as wages, productivity, labor demand, output, and welfare. To accomplish this objective, we employ two distinct analytical approaches. Firstly, we use a reduced-form model to examine whether the MEI program has had any influence on the structural composition of the economy. In particular, we assess whether the availability of internet access, as

¹In 2019, more than 9 million entrepreneurs in Brazil were MEIs, accounting for almost 70% of Brazilian firms.

proxied by the distance between 3G antennae to the Census tract areas, affects the opening and hiring activities of firms after July 2009, when online registration of MEIs started. The results show that the number of firms created through the MEI program increased in areas close to 3G antennae after July 2009, while the number of traditional work contracts decreased. This is equally consistent with a substitution away from labor contracts towards *pejotização* or with an increase in microentrepreneurship among individuals previously hired as workers.

To separate between the two competing explanations of the reduced form results and also capture the full general equilibrium effects of the MEI program, I complement my analysis with a structural model estimated with Brazilian data, which builds upon the approach in [Ulyssea \(2018\)](#). My model allows agents to choose between four different arrangements: traditional work contracts, MEI work, MEI entrepreneurship, and being an employer-owner of a larger firm. Upon estimating my model, I find that 53% of MEIs operate as workers. I then implement four counterfactual analyses to examine the impact of alternative policy scenarios: no MEI, no “Pejotização”, higher enforcement against illegal hiring, and lower payroll tax. Our findings suggest that all the counterfactual policies analyzed lead to an increase in welfare compared to the baseline economy, resulting in higher average productivity and output. These results are mainly driven by the exit of unproductive firms from the market. Moreover, all counterfactuals reduce illegality, leading to higher tax collections. Of these four policy scenarios, “Lower payroll tax” stands out, as it generates the highest welfare gain, despite decreasing payroll tax collection. Importantly, it is the only policy that raises wages and provides higher earnings for workers who switch from illegal to legal employment. This result suggests that reducing the tax burden on firms for each worker is the most effective way to combat illegal hiring.

We contribute to the literature on the impacts of reducing entry costs and taxes ([Rocha et al., 2018](#)), and find that MEI incentivizes the formalization of existing informal firms. Our paper also relates to the literature analyzing the effects of reducing bureaucratic costs ([Bruhn, 2011](#); [Kaplan et al., 2011](#); [de Mel et al., 2013](#)) and imposing tax reductions and simplification ([Monteiro and Assunção, 2012](#); [Fajnzylber et al., 2011](#); [Alvarez et al., 2022](#)). In a structural framework, [Meghir et al. \(2015\)](#) demon-

strate that tightening enforcement in the labor market results in higher wages and better allocation of workers in terms of job productivity. [Ulyssea \(2018\)](#) analyze the aggregate effects of policy changes that account for the intensive (worker-level) and extensive (firm-level) margins of informality. [Haanwinckel and Soares \(2021\)](#) build a search model with informality and calibrate the model using Brazilian data. They show that changes in the workforce composition are responsible for a significant share of the fall in informality in the country between 2003 and 2012, and that progressive payroll taxes can effectively reduce informality.

The paper is organized as follows. In Section 2, we present the main characteristics of MEI, workers, and *pejotização* in Brazil. Section 3 outlines the data used in our empirical and theoretical framework. In Section 4, we present our empirical framework and results. Section 5 describes our theoretical framework. ?? explains our estimation procedure. In 7, we present the results from MEI and alternative policies. Finally, in Section 8, we offer concluding comments.

2 Background - MEI tax system, Labor laws (CLT), and *pejotização*

This section provides a succinct overview of three important economic concepts in Brazil: the Microentrepreneur Individual (MEI) tax system, the Consolidation of Labor Laws (CLT), and the phenomenon of *pejotização*. The MEI framework is aimed at facilitating the formalization of self-employed individuals and small business owners, with the ultimate objective of enhancing contributions to the social security system and affording access to social security benefits. Conversely, the CLT is the principal labor legislation in Brazil, which mandates employers to register employment details of their workers and guarantees various benefits such as rest, vacation, and overtime pay. Lastly, *pejotização* is a term that denotes the practice of hiring workers as individual entrepreneurs, enabling companies to sidestep labor taxes and benefits, and thereby transferring the responsibility of social security and labor rights to the employee.

2.1 MEI Tax System

The Microentrepreneur Individual (MEI) was created in 2008 through the Complementary Law no. 128 to provide a specific legal framework for self-employed workers and those who aspire to become small business owners, with the objective of formalizing millions of informal self-employed and to increase contributions to the social security system.

The process of formalization is simple, fast, and free, enabling the MEI to obtain registration in the National Registry of Legal Entities (CNPJ). To become an MEI, the entrepreneur must comply with certain legal activities and not earn more than R\$ 60,000.00 annually from sales within the country, in addition to not having a stake in another company or establishment - whether as a partner, administrator, or owner - or have another establishment. The MEI must opt for the tax regime of SIMPLES Nacional, and after formalization, pay the DAS (Document of Collection of SIMPLES Nacional) monthly. Through the SIMPLES program, the Microentrepreneur Individual (MEI) is exempt from paying federal taxes, including the Corporate Income Tax. However, the MEI contributes a fixed monthly amount equivalent to 5% of the minimum wage to the National Institute of Social Security (INSS). The process of formalization can be carried out online, and the MEI can also conduct business and fulfill their tax and tax obligations online. Although it is no longer indispensable to hire an accountant, access to a computer becomes almost imperative in the daily life of the Microentrepreneur.

The registration of the individual entrepreneur in the National Registry of Legal Entities (CNPJ) brings benefits such as the issuance of invoices, opening of bank accounts, and access to easy loans from public banks. One advantage of formalization as an MEI is the social security benefits, including retirement by age, disability retirement, sickness allowance, maternity pay, death pension, and imprisonment allowance. The family of the microentrepreneur is also entitled to some benefits. The entrepreneur is assured in cases of sickness absence, retirement by age, disability retirement, and maternity pay (in the case of pregnant women and adopters, after a minimum number of contributions), and the family also has the right to a death

pension and imprisonment allowance. Retirement by age is granted to women at 60 years and men at 65 years, subject to a minimum contribution period of 15 years. Disability retirement, sickness allowance, and maternity pay are also available.

In July 2009, the program started by eliminating monetary entry costs and introducing a web platform for online business registration, which consolidates all procedures required by agencies at national and sub-national levels into a few online steps. Due to technical constraints, this platform was not available to all states simultaneously [Rocha et al. \(2018\)](#). It first starts in four States: São Paulo, Minas Gerais, Rio de Janeiro and Distrito Federal.

2.2 Consolidation of Labor Laws (CLT)

According to article 13 of Law N^o 5.452, 1^o may 1943, "the Employment and Social Security Card is mandatory for the exercise of any job, including rural employment, even if on a temporary basis, and for the self-employed exercise of paid professional activity." In Brazil, every employee has to be registried and has all work rights in every type of job. In every hiring, the employer has to follow all stages impose by law. The employees social security benefits are at least similar or better them the ones cited in [2.1](#), but there are a lot more benefits to the employees and impositions on the employer.

The Consolidation of Labor Laws (CLT) is the primary labor legislation in Brazil that ensures several benefits to workers. First, it requires employers to register a worker's employment details, such as start date, role, and salary, with the Social Security and Labor Booklet (CTPS) within 48 hours of their admission. The CLT also mandates that all workers are entitled to receive a salary for their work, and the maximum working time is 8 hours per day or 44 hours per week. Any additional working hours must be compensated with a minimum of 50% overtime pay, while Sunday and holiday work must be paid at a rate of 100%.

The CLT also guarantees workers' right to rest, with one day off per week as part of the Remunerated Weekly Rest (DSR) regulation. The worker must receive 24

consecutive hours of rest, ideally on Sundays. Additionally, the CLT stipulates that all workers are entitled to paid vacation, with an additional one-third of their salary.

Workers are also entitled to receive a transportation voucher from their employer to cover their commuting expenses, with a maximum deduction of 6% from their gross salary. Payment of salaries should occur by the fifth business day of the month, and employers who fail to do so may be fined and sued. The worker will receive a minimum wage as compensation, with the amount doubling in case of a repeated delay in payment.

The CLT also mandates that all workers receive a break during their workday for personal hygiene, health, safety, and meal times. Employers are also responsible for paying workers who are forced to perform duties outside of their job description or perform tasks from other positions not related to their contract.

Workers who are in hazardous or unhealthy environments are entitled to additional compensation, such as danger or insalubrity pay. Finally, employers must contribute 8% of each employee's gross salary to the Guarantee Fund for Length of Service (FGTS) every month, which is deposited into an account in the worker's name. The 13th salary, an additional month's pay, is also mandatory for all workers and is paid in two installments. Workers who work overnight between 10 pm and 5 am must receive a 20% increase in their salary. If the worker is terminated, the employer must provide a 30-day notice period.

2.3 “Pejotização” - Evidence

“Pejotização” is a Portuguese term used in Brazil to describe a labor practice where employers require workers to register as individual taxpayers and provide services through a legal entity instead of hiring them as employees protected by the Consolidation of Labor Laws (CLT). This practice is often used to circumvent labor regulations and social security contributions, resulting in a reduction of labor costs for employers. However, it also exposes workers to precarious working conditions and limits their access to social security benefits and labor protections. In the Brazil-

ian context, "pejotização" has been a controversial topic among policymakers, labor unions, and workers' rights advocates, as it represents a challenge to the country's labor market institutions and social welfare system.

The problem has been discussed in widely circulated newspapers. In *ISTOÉ Dinheiro* (2022), according to a study conducted by the Brazilian Institute of Geography and Statistics (IBGE), less than 40% of Brazilian workers are employed under the labor laws established by the CLT. Becoming a self-employed individual is becoming increasingly common among Brazilian workers due to the flexibility and higher earnings potential associated with this type of work arrangement. This trend may have implications for social security, labor rights, and income inequality in Brazil.

The use of "pejotização" has been a controversial topic in Brazil, with legal decisions and court cases bringing attention to the issue. The Labor Court of the State of Ceará, Brazil, has found a company guilty of violating labor laws and ordered it to pay compensation to affected workers for engaging in "pejotização". *Labour court* (2020) "Conviction: The ruling of the 3rd Panel of the Labor Court of the State of Ceará, Brazil, has found the company guilty and ordered it to pay the worker severance pay, 13th salary, and accrued vacation for the period between 2006 and 2010. Additionally, the company must correct the date of termination recorded in the employee's work card and make deposits related to 15 years of the Guarantee Fund for Length of Service (FGTS), with a 40% penalty. This decision sets a legal precedent for holding companies accountable for violating labor laws and failing to comply with the payment of labor benefits."

As shown in Figure 1, the frequency of the term "pejotização" in legal decisions has increased in recent years, especially after the creation of MEI in 2009. The Minister of Labor and Employment has also commented on the issue "The MEI is not the problem, as he owns the popcorn cart. However, if someone has ten carts and hires ten popcorn sellers as MEIs, they are employees, and what exists is a labor fraud..." *Folha de São Paulo* (2023).

One of the main benefits of hiring a MEI is the lower costs for the employer. MEI does not have the same obligations as an employee under the CLT, such as

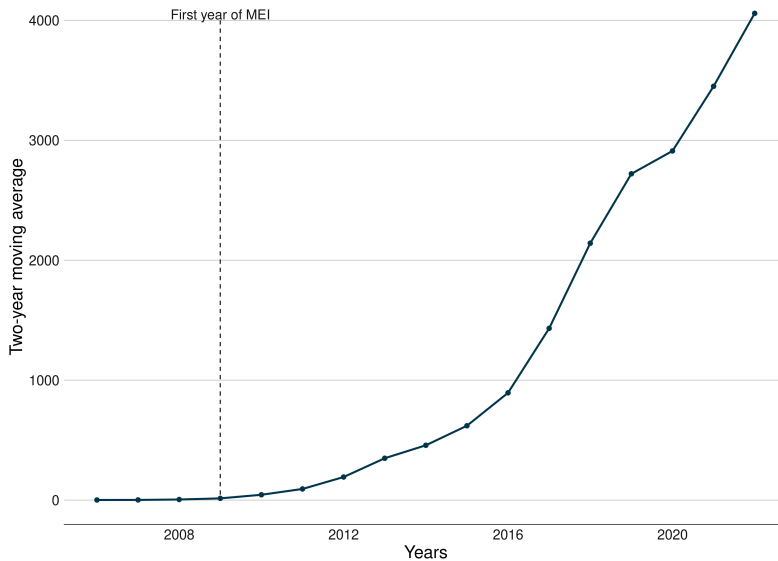


Figure 1: *pejotização* across judgments, decisions, or sentences

Notes. The present figure illustrates the moving average of the frequency of the term "pejotização" across judgments, decisions, or sentences.

severance pay, 13th salary, social security, and paid vacation. MEI also does not have to contribute to the unemployment insurance fund or the severance indemnity fund. As a result, employers can save a significant amount of money by hiring a MEI instead of a CLT-protected employee.

On the other hand, hiring an employee under the CLT provides greater job security and social protection. Employees under the CLT have the right to receive severance pay in case of unjustified dismissal, 13th salary, vacation, and social security. Additionally, employers are required to contribute to the severance indemnity fund and the unemployment insurance fund, which provides protection to the employee in case of dismissal. These protections ensure that employees are not left without income or support if they lose their job.

Another benefit of hiring a MEI is flexibility. MEI is allowed to provide services to multiple clients and can set their own schedules. This provides the employer with greater flexibility in terms of scheduling and workloads. In contrast, employees under the CLT are subject to a fixed schedule and may have more difficulty balancing work and personal obligations. In [Folha de São Paulo \(2021\)](#), a person not hired as CLT

said "I work more now, but I have schedule flexibility, I can, for example, pick up and drop off the children at school." Another case "Halfway through the month, her workday averages about 15 hours a day. In the other half, it's 12 hours. Among the jobs are weekend shifts — she works three per month..."[Folha de São Paulo \(2021\)](#). Hiring a MEI may be more cost-effective and flexible, while hiring an employee under the CLT provides greater job security and social protection.

3 Data and Summary Statistics

This paper employs four primary datasets to conduct our empirical analysis. The first dataset is the "National Register of Legal Entities," a comprehensive government registry of all formal firms in Brazil, which includes information on their respective tax regimes. We utilize this database to differentiate firms that choose to be MEI from other tax regimes and also to get the share of MEI in economy as a moment to the theoretical model. The second database is RAIS, an administrative dataset that contains mandatory annual reporting of firms in Brazil. Non-compliant firms face fines, and the government keeps their registries to tax companies, calculate unemployment insurance, and formulate policies for the labor market. This database have all firms with at least one employee.

For our empirical exercise, we use data from 2008 to 2011, close to the time when MEI was introduced in July 2009. Due to technical constraints, the MEI's platform was not available to all states simultaneously as mentioned [2.1](#), so the empirical analyses focus in the State of São Paulo. The RAIS database provides us with valuable employee information, such as occupation, average income, and length of service. We use data from 2019 to construct our moments and calibrate some parameters.

To obtain information on the geographical location of firms, I utilize both the National Register of Legal Entities and RAIS databases. Our third dataset is the data on the locations of 3g antennae in the State of São Paulo, which we obtain from the National Telecommunications Agency. This dataset contains information on the localization of the antennae in 2008. Finally, we use the Census 2010 dataset

to obtain information on Census tracts, which allows us to calculate the distance to the antennae and determine if an area is rural. We use the area of each Census tract in the calculations.

4 Empirical Model

We use a dynamic difference-in-differences specification to assess pre-treatment and post-treatment effects of easing registration costs on firm and job creation. In particular, we estimate the following model at the census tract level:

$$Y_{cq} = \sum_{\tau=-5}^{10} \beta_{\tau} \cdot [\text{Distance}_c \cdot \mathbf{1}(q - 2009Q2 = \tau)] + \gamma \cdot \text{Distance}_c + \phi_q + \rho_s + \lambda X_{cq} + \varepsilon_{cq} \quad (1)$$

where Y_{cq} is the dependent variable for Census tract c in quarter q , and Distance_c is the distance between Census tract and the nearest 3g antenna. The indicator variable $\mathbf{1}(q - 2009Q2 = \tau)$ equals one if quarter q is τ quarters ahead of the second quarter of 2009, which is the last quarter before the MEI website was in place. We define Distance_c as the distance in km between the Census tract and the nearest 3g antenna in 2008. In this case, $100 \cdot (\beta_{\tau} + \gamma)$ corresponds to the average effect in percentage points on quarter q in the dependent variable Y of an increment of 1 kilometer in the Distance between a census tract and the nearest 3g antenna; and $100 \cdot \beta_{\tau}$ corresponds to the differential effect vis-à-vis the second quarter of 2009. The β_{τ} are our parameters of interest, as after the start of online MEI registration in July 2009, they embody the effect of easing registration costs on firm and job creation. Since there is no MEI program before July 2009, we expect $\beta_{\tau} = 0$ to $\tau < 0$.

We use 16 quarters in the analysis (from first quarter of 2008 to the last quarter of 2011). To control for aggregate trends, our specifications account for time effects ϕ_q . As the finest Census aggregation after Census tract is sub-district, we propose to base our estimates on within-sub-district variation. Therefore, Equation (1) includes sub-district fixed effects (ρ_s). Controlling for between-sub-district variability is important

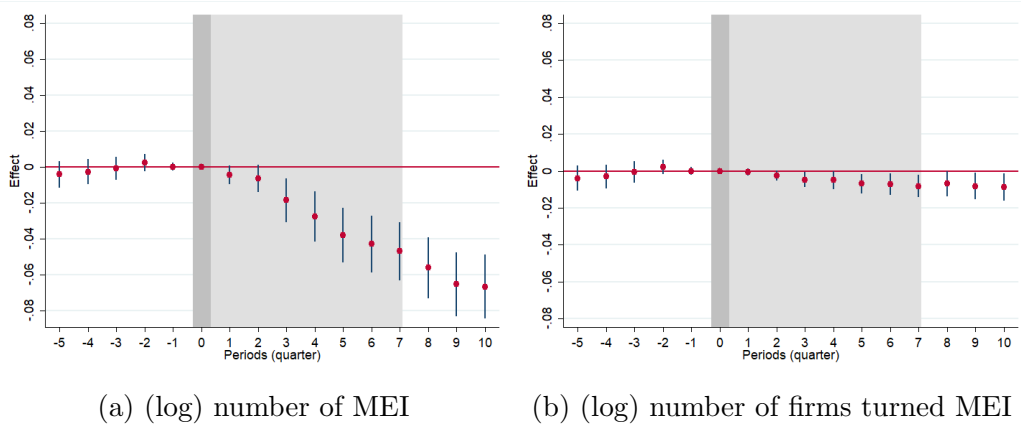
to isolate our estimation from any sub-district-specific shocks that could be systematically associated with access to internet. Having within-sub-district variability is also crucial for identifying the effect because we cannot control for internet intensity at a finer level than Census tract. To account for the fact that access to internet is strongly correlated with urbanization and urban regions may have different trajectories in job and firm creation, we include in X_{cq} the interaction between time fixed effects and a rural area dummy. To account for the plausible correlation of policies within sub-district and time, we cluster the standard errors at the sub-district level.

Our identifying assumption is that, conditional on the controls in the previous paragraph, Census tract with different distance to the 3g antennae would have had similar trends in Y were their distances to similar. Under this assumption, estimates of model (1) enables us to assess the effects of easing registration costs, as proxied by distance to 3G, on firm and job creation.

4.1 Empirical Results

As a means of validating our empirical model, we observe in Figure 2 that the number of firms enrolled in the MEI tax system decreases as distance to the nearest 3G antenna increases. This effect is only present after 2009, as expected. Prior to 2009, the firms in question represent those that switched to the MEI tax system upon its introduction, and we do not find significant effects among these. Our regression analysis draws upon the "National Register of Legal Entities database," which contains information on all formal firms in Brazil.

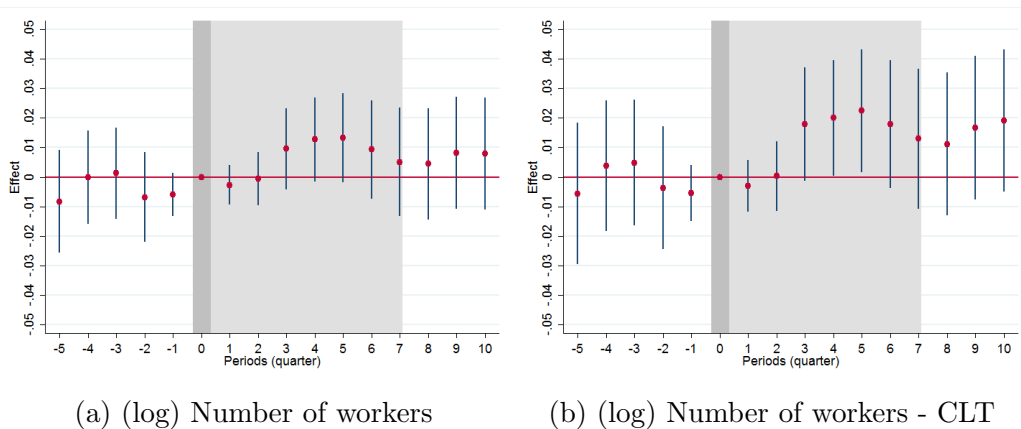
Figure 2: MEI



Notes. Point estimates and 95% confidence intervals for the parameters of the model in Section 4. The number of observations is 516,459. Standard errors clustered at the subdistrict level (36,292 clusters). The dependent variable in (a) is the log of the number of MEIs in each Census Tract and in (b) is the log of the number of firms that turn MEI in each Census Tract.

The following results present regressions using the RAIS database, which includes all firms with at least one employee but excludes MEI firms that do not have employees. Figure 3a shows that firms located further away from 3G antennae tend to hire more employees than those closer to the antennae. This effect is even more pronounced when looking only at employees hired under the Consolidation of Labor Laws (CLT). These findings suggest a substitution effect in areas near 3G antennae where more Micro-Entrepreneurs (MEI) are available.

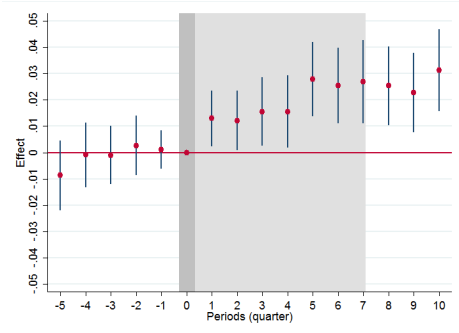
Figure 3: Employees



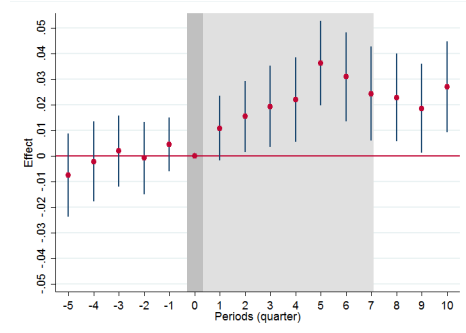
Notes. Point estimates and 95% confidence intervals for the parameters of the model in Section 4. The number of observations is 516,459. Standard errors clustered at the subdistrict level (36,292 clusters). The dependent variable in (a) is the log of the number of employees in each Census Tract and in (b) is the log of the number of employees under the CLT in each Census Tract.

The panel in the following figure (4) presents data on the number of firms categorized by the number of employees, ranging from up to 1 employee to 20-49 employees, as well as the corresponding revenue for each category. From the figures presented, it is evident that the trend of decreasing firm size is observed across multiple firm sizes, and not limited to just the smaller firms that may switch to the MEI tax system.

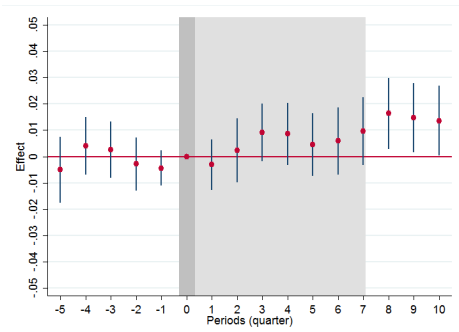
Figure 4: (log) Number of firms and revenue



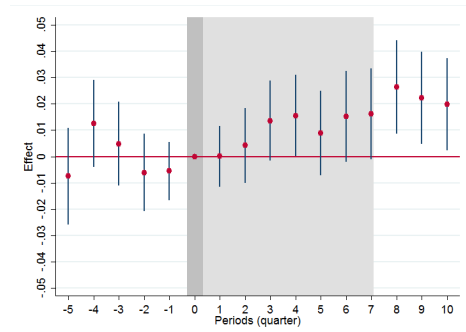
(a) (log) Number of firms - 1 employee



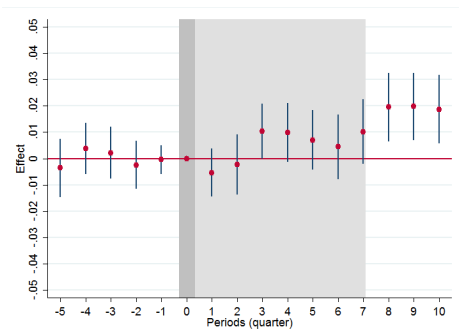
(b) (log) Firms Revenue - 1 employee



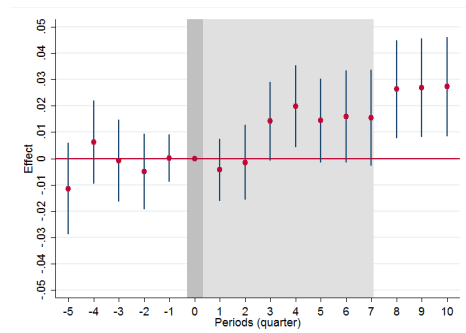
(c) (log) Number of firms - 2 to 9 employees



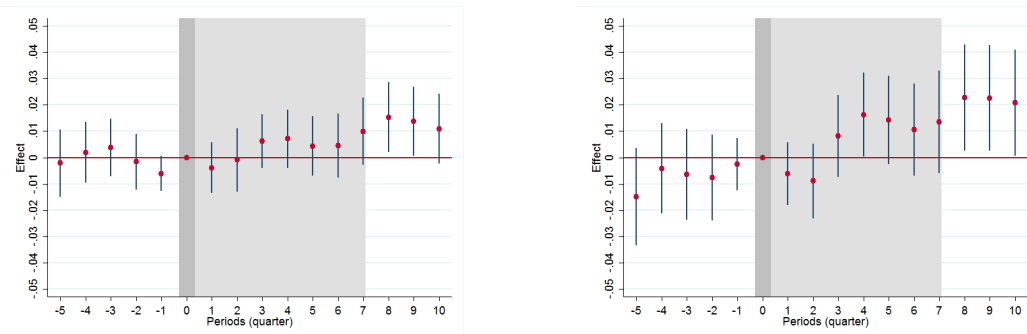
(d) (log) Firms Revenue - 2 to 9 employees



(e) (log) Number of firms - 10 to 19 employees



(f) (log) Firms Revenue - 10 to 19 employees



(g) (log) Number of firms - 20 to 49 employees (h) (log) Firms Revenue - 20 to 49 employees

Notes. Point estimates and 95% confidence intervals for the parameters of the model in Section 4. The number of observations is 516,459. Standard errors clustered at the subdistrict level (36,292 clusters). The dependent variable on the right is the log of the number of firms with X to X employees in each Census Tract and on the left is the log of the total revenue of firms with X to X employees in each Census Tract.

5 Theoretical Model

Our theoretical model, building on the works of Melitz (2003) and Ulyssea (2018), extends the latter by incorporating three key modifications. First, we consider two sectors in our economy: the MEI sector and the Standard formal sector. Second, Standard formal firms are allowed to hire formal workers as well as illegally hired workers from the MEI sector (*pejotização*). Lastly, individuals have an outside option of working legally.

Our economy consists of individuals with heterogeneous entrepreneurial productivity levels indexed by z . Firms use labor as the sole factor of production to produce a final good. For firms with entrepreneurial productivity level z and employing l workers, the final output produced is given by $y(z, l) = zq(l)$, where $q' > 0$ and $q'' < 0$. We normalize the price of the final good to 1. The model is dynamic, with a mass M of entrants choosing their sector s before undertaking production in each period $t \in \mathbb{N}$. Individuals can operate under two different regimes: the MEI (m) or the Standard formal (f), and they also have an outside option to work legally (wr). Incumbents in each sector die with probability ρ_s , where $s \in m, f, wr$, and the mass of incumbent firms in sector s is denoted by μ_s .

5.1 Occupational Choice Problem

5.1.1 MEI sector

An individual who chooses to operate in the MEI sector can either be a micro-entrepreneur, in which case she earns her productivity level z and pays a fixed cost \bar{c}_m , or a *pejotizado* worker, in which cases she earns a *pejotizado* wage w_{fm} . Denoting by $\pi_m(z, w_{fm})$ the profit of a MEI with productivity z , we thus have that:

$$\pi_m(z) = \max\{w_{fm}, z - \bar{c}_m\}. \quad (2)$$

Observe that *pejotização* provides a lower bound for the profitability of MEI firms.

5.1.2 Standard formal sector

An individual who chooses to operate as a Standard formal entrepreneur hires workers from both the legal (CLT) labor market and the *pejotizado market*. Wages in the CLT market are denoted by w , whereas w_{fm} denotes wages in the *pejotizado* sector. Labor contracts in the CLT sector are subject to a payroll tax rate τ_w : consequently, the cost of hiring l workers in the CLT market is given by $(1 + \tau_w)wl$. Contracts in the *pejotizado* market are not subject to payroll taxes. However, hiring *pejotizado* workers is illegal, and there is a probability of being caught by authorities. Consequently, we model the cost of hiring l MEI workers as $w_{fm}\phi(l)$, where $\phi' > 0$ and $\phi'' > 0$, $\lim_{l \rightarrow \infty} \phi'(l) = \infty$ and $\phi'(0) = 1$. The cost of hiring *pejotizado* workers is thus assumed to be convex and increasing, which can be thought to reflect that avoiding detection becomes increasingly difficult for larger firms.

Standard formal firms are further subject to a revenue tax rate τ_f , and a fixed cost of operation given by \bar{c}_f . Consequently, the profit of a standard formal entrepreneur with productivity level z is given by:

$$\pi_f(z) = \max_{l \geq 0} \{(1 - \tau_f)zq(l) - C(l)\} - \bar{c}_f, \quad (3)$$

where

$$C(\ell) = \begin{cases} \phi_{fm}(\ell)w_{fm} & \text{for } \ell \leq \bar{\ell} \\ \phi_{fm}(\bar{\ell})w_{fm} + (1 + \tau_w)w(\ell - \bar{\ell}) & \text{for } \ell > \bar{\ell} \end{cases}, \quad (4)$$

with $\bar{\ell}$ being the threshold after which it is profitable to hire CLT workers. Observe that, for there to exist *pejotização*, i.e. $\bar{\ell} > 0$, it must be that $w_{fm} < (1 + \tau_w)w$.

5.1.3 Formal job

If an individual chooses to be a CLT worker, she earns a wage w irrespective of her entrepreneurial ability, i.e.

$$\pi_{\text{wr}}(z) = w.$$

5.2 Entry

Before entering the market, entrant individuals observe only a signal θ of their actual productivity, which is drawn independently across individuals according to a distribution G , where G is absolutely continuous in $(0, \infty)$ and all its moments are finite. Every period, we have a mass M of possible entrants. To enter each sector, individuals face an entry cost of E_s , where $E_f > E_m$ and $E_{wr} = 0$. This assumption reflects the increasing bureaucracy associated with the formalization of firms. Moreover, as the MEI tax scheme is substantially simpler than the regular tax scheme for Standard formal firms, entry costs for Standard formal firms are the highest among the sectors. This may happen because Standard formal firms may need to spend extra money with accountants and lawyers to deal with the red tape excess in the Standard formal sector.

After entering a sector, an individual extracts from the conditional cumulative distribution function $F(z|\theta)$ their actual productivity level z . If their realized productivity level is small enough, an individual in sector s immediately leaves the market,

i.e., if $z < \bar{z}_s$, where \bar{z}_s is given by $\pi_s(\bar{z}_s, w) = 0$, the individual immediately leaves. Otherwise, the individual begins production and becomes an incumbent in the following periods. As previously described, in each period, incumbents exogenously die with rate ρ_s at each sector s .

In light of the above discussion, individuals choosing sector s have the following post-entry value function

$$V_s(z) = \max \left\{ 0, \frac{\pi_s(z)}{\rho_s} \right\},$$

and the following pre-entry expected value function

$$V_s^e(\theta) = \int V_s(z) dF(z|\theta), \quad s = f, m, wr. \quad (5)$$

Hence, individuals with a given θ decide whether and in which sector to enter by following the rules below:

1. Do not enter if $\max_s \{V_s^e(\theta) - E_s\} < 0$.
2. Enter in sector s' if $V_{s'}^e(\theta, w) - E_{s'} \geq 0$
and $s' = \operatorname{argmax}_s \{V_s^e(\theta, w) - E_s\}$.

If the entry in the three sectors is positive (not necessarily for the same individual), the following entry conditions are valid:²

$$\begin{aligned} V_{wr}^e(\bar{\theta}_{wr}, w) &= 0, \\ V_m^e(\bar{\theta}_m, w) &= V_{wr}^e(\bar{\theta}_m, w) + E_m, \\ V_f^e(\bar{\theta}_f, w) &= V_m^e(\bar{\theta}_f, w) + (E_f - E_m), \end{aligned} \quad (6)$$

where $\bar{\theta}_s$ is the pre-entry productivity signal of the last individual to enter sector $s = wr, m, f$. For example, firm $\bar{\theta}_f$ is indifferent between the MEI and the standard formal sectors. So all firms with $\theta > \bar{\theta}_f$ enter the Standard formal sector.

²We focus on an equilibrium where individuals with high signals choose the Standard formal sector, individuals with mid signals choose the MEI sector, and individuals with low signals choose to be a worker. This is the most likely outcome given that $E_f > E_m$ and $E_{wr} = 0$.

5.3 Labor markets

The economy has two labor markets, one for legal workers (CLT) and one for *pejotizados*. Labor supply in the legal market consists of those individuals opting to work legally. There is also a fixed inelastic supply of “short lived” workers who offer an aggregate of \bar{L} units of labor in this market. The supply in the *pejotizado* market is given by the mass of MEI entrepreneurs who opt to work for a wage.

5.4 Demand and Welfare

There is a representative household enjoys utility from consuming the final good. Household members cannot save, so they consume their income. All tax revenue is transferred back to households. Hence, welfare W is given by total consumption, which is equal to $w.\bar{L} + \Pi + T$, i.e., equals the sum of total wage payments, total profits (net of entry costs), and total tax revenues.

5.5 Equilibrium

We analyze the behavior of the model in a steady state equilibrium. In such equilibrium, both labor markets clear. Moreover, the size of the formal and MEI sectors, as well as the formal labor market, remains constant. This implies that the number of successful entrants (i.e., individuals which choose a sector and do not immediately die) must be equal to the number of individuals that die in each sector in every period. This gives us the equilibrium condition:

$$\mu_s = \frac{1 - F_{z_s}(\bar{z}_s)}{\rho_s} M_s, \quad (7)$$

where μ_s is the mass of active individuals for each sector, and M_s is the measure of entrants for each sector: $M_f = [1 - G(\bar{\theta}_f)]M$ for the standard formal sector; and, finally, $M_m = [G(\bar{\theta}_f) - G(\bar{\theta}_m)]M$ for the MEI sector. $1 - F_{z_s}(\bar{z}_s)$ is the (unconditional) probability that an individual survives in sector s . This definition of equilibrium is useful, as it allows us to pin down the number of individuals in each sector from the

mass of entrants and the exit rate, which will be crucial in computing some moments when estimating our model.

6 Estimation

6.1 Parametrization

The pre-entry productivity distribution is assumed to be Pareto:

$$F_{\theta}(\theta \geq x) = \begin{cases} \left(\frac{\eta}{x}\right)^{\delta} & \text{for } x \geq \eta, \\ 1 & \text{for } x < \eta. \end{cases} \quad (8)$$

We then parametrize the post-entry productivity process as follows:

$$\begin{aligned} z &= \theta \cdot \epsilon, \\ \epsilon &\sim \text{log-normal}(0, \sigma^2). \end{aligned} \quad (9)$$

We use the span-of-control formulation from [Lucas \(1978\)](#), $y(z, l_s) = zl_s^{\alpha}$ with $\alpha < 1$. The Standard sector's extensive marginal cost is defined as $\phi(l) = l(1 + l/b_i)$. Finally, the fixed costs for each tax regime are $\bar{c}_s = \gamma_s w$ with $0 < \gamma_s \leq 1$.

6.2 Calibration

We calibrate the following vector of parameters:

$$\Omega = \{\tau_{w_f}, \tau_f, \rho_f, \rho_w, \gamma_f, E_w, E_m\}.$$

$\tau_{w_f} = 0.375$ is calibrated based on statutory values.³ $\tau_f = 0.3865$ correspond to IR (15%), IPI (20%) and PIS/COFINS (3,65%).

The exit probabilities in the Standard formal sector is set to $\rho_f = 0.0111$. These

³employer's social security contribution (20%), direct payroll tax (9%), and severance contributions (FGTS) (8.5%)

are estimated using a panel dataset constructed from RAIS by calculating the death probability of firms. η establishes as one the minimum firm size and γ_f is defined as one. Workers' entry cost is set at 0 and the MEI's entry cost is set at R\$ 55 which corresponds to how much the entrepreneur has to pay each month.

6.3 Estimation method

We will use a Minimum Distance (MD) estimator to the 10×1 ψ vector of parameters from our model:

$$\psi = \{\rho_i, b_i, \delta, \alpha, E_f, E_i, E_{fs}, \sigma, \gamma_i, \gamma_{fs}\}.$$

Define $m = h(\psi)$ as a vector of reduced-form parameters, where $h(\psi)$ maps the parameters into the reduced-form parameters. We also have a vector of moments from the data \hat{m} . So, the MD estimator of ψ first estimates m by \hat{m} and then chooses an estimator $\hat{\psi}$ of ψ by making the distance between \hat{m} and $h(\hat{\psi})$ as small as possible. We use a weighted Euclidean distance to compute the distance between \hat{m} and the model vector of moments $h(\psi)$. In particular, each moment is weighted by the inverse of its sampling variance.

Our minimum distance estimator solves

$$\min_{\psi \in \Psi} \{\hat{m} - h(\psi)\}' \hat{W} \{\hat{m} - h(\psi)\}, \quad (10)$$

where Ψ is the parameter space, and \hat{W} is a diagonal matrix with the inverses of the sampling variances of each moment in the diagonal. Given the non-differentiability of our moments and potential non-convexity in parameters, we use simulated annealing to solve the minimization problem above.

6.3.1 Moments

In our estimation, we must choose moments to match their model counterparts. We will use: (1) the share of firms in each sector and by firm size (e.g., the overall share of

workers, share of MEI firms), as well as (2) moments related to the size distribution in Standard sector, e.g., the share among formal firms of those with up to two workers. Given this notation, we use the following 7 moments in the estimation: general overall share of workers; general overall share MEI; within-sector share Standard up to 2; within-sector share Standard between 3 to 4, between 5 to 10, between 10 to 20, between 20 to 50 workers.

6.3.2 Identification

In this section, we will provide some insight into the identification of the parameters in our model as they relate to the chosen moments.

The parameters pertaining to entry cost (E_f) are linked to the within-sector shares of small firms. As the entry cost increase, the number of firms entering decreases. Similarly, the fixed cost (γ_m) is associated with general share of MEI and determine whether or not a firm can continue to operate within MEI sector. The shape of the Pareto distribution (δ) is determined by the size distributions within each sector, and this parameter defines the degree of concentration on the left side of the distribution.

The parameter b_i , which influences the marginal cost of hiring for Standard firms, is related to the share of MEI firms, and within-sector shares of small Standard firms with similar productivity. As Standard firms hire more workers, the risk of being caught by inspection increases, thereby affecting this parameter.

Another parameter that is linked to firm shares is ρ_m , which represents the MEI sector's exit probability and is a component of our value function equation. It imposes a penalty on the MEI sector to the detriment of other sectors. Finally, the variance of the post-entry shock (σ) is determined by the size distributions and the extent of overlap between the firms in each sector. The Illegal workers' wage are defined via market clearing in the supply and demand of workers from MEI sector.

6.4 Estimation Results

Table 2 shows our model fit. It compares the estimated moments to the data ones. We can see that our model matches the data reasonably well.

Table 1: Parameters

Parameters	Model fit	Source
τ_{wj} : Standard payroll tax	0.368	Statutory
τ_f : Revenue tax	0.3865	Statutory
ρ_f : Formal sector's exit probability	0.0144	RAIS
ρ_w : Workers' exit probability	0.0122	RAIS
γ_f : Per-period fixed cost of operation (Standard)	1	Calibrated
E_w : Workers' entry cost	0	Calibrated
η : Pareto's location parameter	675.275	Calibrated
E_m : MEI sector's entry cost	55	Statutory
ρ_m : MEI sector's exit probability	0.0138	Estimated
α : alpha	0.663	Estimated
b_i : Extensive mg.cost	1.249	Estimated
δ : Pareto's shape parameter	2.553	Estimated
σ : Post-entry shock variance	1.072	Estimated
E_f : Formal sector's entry cost	8452.503	Estimated
γ_m : Per-period fixed cost of operation (MEI)	0.25655	Estimated
w_m : Illegal workers' wage	811.004	Estimated

Standard: Formal, MEI and Workers sector estimates results (R\$ 2019).

Table 2: Model Fit

Moments	Data	Model
General share of Workers:	0.867	0.887
General share of MEI firms:	0.0721	0.0714
Within-sector share of Standard firms:		
≤ 2 employees	0.4319	0.4304
3-4 employees	0.1804	0.15041
5-10 employees	0.2081	0.1662
10-20 employees	0.0906	0.0816
20-50 employees	0.0553	0.0706

Notes: Model Fit. MEI and Standard sectors moments from RAIS (Relação Anual de Informações Sociais) database and National Register of Legal Entities database.

7 Counterfactual analyses and Aggregate Effects

In this section, we present a series of counterfactual analyses aimed at reducing illegality in the economy without imposing substantial welfare costs. We first consider an economy, labeled as “Without MEI” in which the MEI sector is entirely eliminated, and individuals must choose between being a formal worker or an entrepreneur who hires only formal workers. We then examine an economy labeled “Without *pejotização*” where participation in the MEI sector is allowed, but hiring illegal workers is prohibited. Next, we investigate an economy with “Higher enforcement,” where the probability of detection by tax authorities is increased. Finally, we analyze an economy labeled “Lower payroll tax,” where a reduction in payroll taxes leads to lower costs of hiring formal employees.

Table 3: Switchers

Switchers	Without MEI	Without “Pejotização”	Higher enforcement	Lower payroll tax
Standard → MEI	0.0	0.0	0.0	0.0
Standard → Worker	0	0	0	0
MEI → Standard	0.091	0.045	0	0
MEI → Worker	0.909	0.955	0.091	0.136
MEI firm → Standard	0.095	0.047	0	0
MEI firm → Worker	0.905	0.953	0.089	0.134
Illegal Workers → Standard	0.087	0.044	0	0
Illegal Workers → Worker	0.913	0.956	0.093	0.139
Worker → Standard	0	0	0	0
Worker → MEI	0	0	0	0
Worker → firms	0	0	0	0
Firms → Worker	0.183	0.193	0.018	0.028

Notes: Sector changes from an economy with MEI to an economy without MEI regime and an economy without illegal hiring. The numbers correspond to all entrants firms. For example, 9% of entrants in the MEI sector choose to change to the Standard sector in an economy without MEI (considering successful and unsuccessful entrants).

Table 4: Aggregate Effects

	Baseline	Without MEI	Without “pejotização”	Higher enforcement	Lower payroll tax
Share MEI	0.63409	0	0	0.6152	0.6091
Share Illegal hiring (MEI)	0.531	0	0	0.512	0.540
Wages Standard	1	0.994	0.996	0.998	1.024
Wages MEI	1	0	0	0.952	1.049
Average Firm Size (All workers)	1	1.004	1.223	1.020	1.053
Mass of firms (Standard)	1	1.016	0.825	0.985	0.960
Mass of firms (All)	1	0.560	0.455	0.967	0.909
Productivity					
<i>Average</i>	1	1.441	1.610	1.013	1.053
Output					
<i>Total</i>	1	1.008	1.001	1.002	1.006
<i>Average</i>	1	1.799	2.199	1.036	1.107
Taxes					
<i>Revenue tax</i>	1	1.014	1.007	1.003	1.007
<i>Payroll tax</i>	1	1.020	1.021	1.005	0.911
<i>Total tax</i>	1	1.014	1.007	1.003	1.007
Payroll	1	1.027	1.025	1.004	1.036
Profit	1	0.987	0.978	1.001	1.003
Welfare	1	1.013	1.008	1.003	1.017
Illegal Workers Revenue (switchers)	1	1.796	1.799	1.804	1.849

Notes: Aggregate effects of an economy without MEI and an economy without illegal hiring. See the Appendix for details of the calculations.

7.1 Without MEI

In this counterfactual analysis, we consider an economy where agents are presented with the choice to operate as formal workers or entrepreneurs, with firms having the option to exclusively employ formal workers, following the removal of the Micro-entrepreneur Individual (MEI) sector. Our analysis of the resulting counterfactual scenario reveals several significant findings.

Firstly, we observe in 3 that a substantial majority (90.9%) of the individuals who previously were in the MEI sector now prefer formal employment, resulting in a

corresponding reduction of 18.3% of the total number of firms in the baseline economy. Additionally, 91.3% of the former illegal workers are now working legally.

The aggregate effects of these changes are presented in 4. Specifically, the increase in the legal labor supply results in a decrease in wages within the Standard sector. This reduction, in turn, prompts an increase in the mass of productive firms in the Standard sector, as the cost of labor declines. Also, the 9.1% of the switchers from the MEI sector helps to boost this mass of firms in the Standard sector. These two positive effects are sufficient to overcome the mass of firms that decided to not produce since they cannot hire illegal workers any more.

However, the overall number of firms and entrepreneurs in the economy declines by nearly half. Despite the decrease in wages, the payroll in the economy increases, owing to the increase in the mass of workers. Furthermore, firms in the economy without the MEI sector exhibit higher average productivity and output levels than the baseline economy.

We also find that the removal of the MEI sector leads to positive effects in tax collection, with more Standard firms hiring legal workers and paying higher payroll taxes. However, the profit generated by firms declines due to the higher entry costs associated with entrepreneurship. Finally, welfare in the economy without the MEI sector is higher than in the baseline economy.

In conclusion, while the MEI sector offers an important entry point for entrepreneurship, it results in higher wages and lower productivity levels in the Standard sector. Furthermore, it leads to lower tax collection in the economy with respect to firms, specifically a reduction in payroll collection. This not only results in lower government revenue, but also incurs future retirement costs for workers (the latter not captured by our model). On a positive note, the removal of the MEI sector enables former illegal workers to receive all the labor rights and corresponding increases in revenue.

7.2 Without *pejotização*

In order to evaluate the impact of prohibiting the hiring of illegal workers, we conduct a counterfactual analysis as a complete removal of the MEI sector is a strong policy measure. Interestingly, we observe that individuals do not choose to enter the MEI sector when significant restrictions are imposed on the hiring of illegal workers. The wage provided by the option to work illegally appears to act as a form of insurance for individuals, as it provides a safety net in the event of low productivity as an entrepreneur in MEI sector. The aggregate results and sector switchers are similar to those found in the previous analysis (Section 7.1), with the exception of a decrease in the mass of firms in the Standard sector that opt to not produce due to the absence of illegal workers. Notably, 19.3% of individuals who chose to be entrepreneurs in the baseline economy now opt to work for a wage.

7.3 Higher enforcement

In this analysis, we implement a policy of higher enforcement on Standard firms that hire illegal workers, as opposed to completely prohibiting their hiring. This measure is designed to create difficulties for illegal hiring without creating significant obstacles for individuals wishing to become entrepreneurs. The implementation of this policy leads to an increase in costs for Standard firms when hiring illegal workers, resulting in a decrease in the demand for such workers and a consequent decrease in their wage. As a result, 9.1% of individuals who previously chose to participate in the MEI sector now opt to work legally. This includes those who previously opted to work as entrepreneurs and illegal workers in the Baseline economy, with 8.9% and 9.3% respectively choosing to work legally for a wage.

The increased supply of legal workers results in a decrease in their wage. We also find a reduction in the mass of firms, similar to the findings in our previous analyses, with less productive firms opting not to produce when faced with higher costs associated with hiring illegal workers. On the other hand, the more productive firms that decide to produce exhibit higher average productivity compared to the

Baseline economy. Furthermore, since the less productive firms do not produce, the average productivity is also higher.

Overall, this policy is less stringent than completely prohibiting the hiring of illegal workers. It has a positive effect in terms of increasing the rights of individuals who previously chose to work illegally. Additionally, the majority of entrepreneurs continue to participate in the MEI sector.

7.4 Lower payroll tax

This policy aims to address the issue of illegal workers without resorting to punishment. By reducing the burden of payroll tax, it incentivizes firms to hire legal workers, thus increasing the demand for legal workers and driving up their wages. As a result, individuals in the MEI sector who previously worked illegally now opt to work legally for a wage, which increases their income. Conversely, the wage for illegal workers increases, which decreases the incentive for individuals to work illegally. However, this policy also has a negative impact on less productive firms, which may choose to cease production. In contrast, more productive firms produce more output, increasing overall productivity in the economy. Despite these benefits, the reduction in payroll tax also leads to a significant decrease in payroll tax collection. Notably, this policy has increased the rights of workers, with 13.9% of illegal workers in the Baseline economy now choosing to work legally.

8 Conclusion

In this paper, we investigate the impact of the Brazilian Microentrepreneur Individual (MEI) program on aggregate outcomes, such as wages, productivity, labor demand, output, and welfare. We adopt two distinct analytical approaches to achieve this objective. Firstly, we employ a reduced-form model to explore whether the MEI program has influenced the structural composition of the economy. Our results indicate that the number of firms created through the MEI program increased in areas close to 3G

antennae after July 2009, while the number of traditional work contracts decreased. This is consistent with a substitution away from labor contracts towards *pejotização* or with an increase in microentrepreneurship among individuals previously hired as workers.

We also analyze four counterfactual policies and find that all of them lead to an increase in welfare when compared to the baseline economy. Moreover, they result in an increase in average productivity and output, as unproductive firms opt not to produce. This is evident in the reduction of the mass of firms that decide to produce and an increase in the average firm size. Additionally, all counterfactuals reduce illegality, leading to an increase in total tax collections. Among the four counterfactuals, the policy of "Lower payroll tax" is the one with the highest welfare gain, despite decreasing payroll tax collection. It is also the only policy that leads to an increase in wages and provides higher revenue for the illegal workers who switch to the legal sector.

Finally, we discover that *pejotização* acts as partial insurance to entrepreneurial risk among self-employed individuals, as it offers an option to work for a wage if their microbusiness is unprofitable. This "buffer" to entrepreneurial risk is crucial, as in a counterfactual scenario where *pejotização* is prohibited, microentrepreneurship disappears. Our results further indicate that raising microentrepreneurship and increasing aggregate output may be conflicting goals, casting doubt on standard justifications for microbusiness supporting programs.

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