Employment and Welfare Effects of the Quota for Disabled Workers in Brazil

Gustavo de Souza

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Employment and Welfare Effects of the Quota for Disabled Workers in Brazil

Gustavo de Souza*

Federal Reserve Bank of Chicago

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Abstract

I study the effect of a quota for disabled workers on the labor market and on welfare. Using a task-based model, I show that the effect of a quota will depend on the productivity of disabled workers and their labor supply elasticity. I estimate the productivity of disabled workers using variation from inspections of the quota. I find that the quota increased the hiring of disabled workers, but it reduced wages and employment of non-disabled workers, suggesting that the quota reduced firms' productivity. I estimate the labor supply elasticity of disabled workers using heterogeneous exposure across regions. Using the model calibrated to the empirical estimates, I find that the quota for disabled workers decreased welfare by 0.33% and forced the government to increase marginal taxes. However, alternatively, a subsidy for disabled workers could increase welfare.

Key Words: quota for disabled workers, disability insurance, fiscal policy

JEL Codes: E6, H2, H5

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Contact: gustavo@microtomacro.net

1 Introduction

The rising cost of disability insurance has become a pressing issue in many developed countries. To tackle this challenge and promote greater labor force inclusion for individuals with disabilities, a number of nations have implemented a quota for disabled workers in large firms, forcing firms to have a percentage of their labor force composed of disabled workers. On the one hand, a quota for disabled workers reduces the cost of disability insurance by encouraging workers to join the labor force. On the other hand, it may distort firms' choices by forcing them to hire workers who are not suitable for the tasks performed at the firm.

In this paper, I study the effect of the quota for disabled workers in Brazil. Brazilian firms with more than 100 workers are required to have from 1% to 5% of their labor-force composed of disabled workers, with requirement increasing discontinuously on firm's size. I show that the quota increased the labor-force participation of disabled workers and decreased the expenditure on disability insurance. However, this came at the cost of lower employment and welfare for non-disabled workers. Overall, the quota for disabled workers in Brazil reduced employment by 0.47% and welfare by 0.33%. I show that subsidizing disabled workers is a strictly better policy, increasing the labor force participation of disabled workers by 64% and overall welfare by 0.29%.

I begin by developing a model to study the labor market for disabled workers and the impact of a quota on firms. In this model, disabled and non-disabled workers must choose between participating in the labor force or staying outside of it. Disabled workers outside the labor force receive disability insurance. Firms produce by performing a range of tasks that can be carried out by either disabled or non-disabled workers, with disabled workers being potentially less productive at certain physically intensive tasks. Firms also incur a fixed cost when hiring disabled workers, capturing adjustments necessary to make the workplace inclusive. The government enforces a quota for disabled workers, levies a payroll tax, and provides disability insurance for unemployed disabled workers.

The impact of the quota on the economy depends on two key parameters: the productivity and the labor supply elasticity of disabled workers. The productivity of disabled workers captures how costly it is for firms to hire them. If disabled workers are as productive as non-

disabled workers, hiring disabled workers will not have a large effect on the marginal cost of firms and, as a consequence, it will not lead to a decrease in firm size. Meanwhile, labor supply elasticity measures the extent to which disabled workers' wages must rise to induce them into joining the workforce. When disabled workers have an inelastic labor supply, meeting the quota requires significant wage increases, driving up the cost for firms. Therefore, to understand the effect of the quota, I need to have precise estimates of the productivity of disabled workers and their labor supply elasticity, which have not been estimated on the literature.

To identify the productivity of disabled workers, I study the effect of inspections of the quota for disabled workers at the firm level. To do that, I collect an administrative matched employer-employee dataset with labor market outcomes of disabled and non-disabled workers and combine it with the universe of quota inspections carried out by the Division of Equal Opportunity of the Ministry of Labor in Brazil, which only enforces the quota for disabled workers.

To identify the effect of enforcing the quota for disabled workers on firms, I exploit the timing of inspections in an event-study design. I compare each inspected firm to firms that are going to be inspected in the future. I provide strong empirical and institutional evidence supporting the assumption that the timing of inspections is as good as random, a crucial identifying assumption. Specifically, I show that neither firm characteristics nor growth rates predict the year of inspection or the probability that a firm will be inspected in the future. Additionally, I show that inspections of the quota for disabled workers do not correlate with other government intervention, such as campaign contribution, public procurement, subsidize loans, and R&D subsidies. Furthermore, I find that inspections of the quota for disabled workers do not correlate with other labor market infractions, which is expected because the Division of Equal Opportunity only enforces the quota for disabled workers.

The enforcement of the quota for disabled workers decreased overall employment and wages, despite increasing the hiring of disabled workers. Inspected firms hired 20% more disabled workers over a two-year period, increasing their likelihood of satisfying the quota by 14%. However, the firm's total workforce decreased by 3%, with non-disabled employment decreasing by 4%. Still, there is a lot of heterogeneity in the effects of the quota. Manu-

facturing and education firms had no employment reduction, while agricultural firms had a decrease of employment by 18%.

Firms make a large decrease in employment to reduce the number of disabled workers that they are required to hire. Because the quota for disabled workers is a discontinuous requirement on firm size, firms are reducing their size to decrease the share of disabled workers that they are required to hire and they are bunching at the discontinuities of the quota. Moreover, the change in employment of non-disabled workers is larger for firms near the cuttoff of the quota, indicating that they manipulate their size to avoid hiring disabled workers. These results suggest that the quota for disabled workers is a costly policy for firms.

Results are robust to different controls, matching, and identification strategies. Specifically, adding controls, matching on long horizons, or matching alternative firm characteristics does not change the results. Moreover, I estimate the effect of inspections by exploiting the information set available to inspectors. Because inspectors use a three-year lag dataset to select firms, they select firms today based on labor information from three-years ago. When I implement the event-study analysis matching firms only on three-year lag outcomes, I still find that the quota increases employment of disabled workers at the cost of an overall reduction in firm size. Finally, I estimate the effect of the quota using a judge leniency instrument.[1] I show that being inspected by stricter inspectors leads to a larger drop in firm size and a larger increase in the hiring of disabled workers. Therefore, several methods indicate that the quota led to a decrease in firm size and an increase in the hiring of disabled workers.[2]

I identify the labor supply elasticity of disabled workers by exploiting heterogeneity in exposure to the quota for disabled workers across regions. Regions with employment concentrated in a few large firms are more exposed to the quota than regions with several small

[1] Following Kling (2006), French and Song (2014), Autor et al. (2019), among many others.

[2] Some alternative identification strategies are not possible. Comparing inspected firms bellow and above the quota cuttoff is not a valid identification strategy. First, as interviews with inspectors reveal, inspections are targeted at large firms. Because of that, only 5% of inspected firms are below the quota threshold. Second, and most importantly, the firms with less than 100 workers are in special trends. Most of these firms used to have more than 100 workers in the years before the inspection. Moreover, a regression discontinuity design cannot identify the causal effect of the quotas. Because inspections target large firms far from the discontinuity kinks of the quota, firms don't bunch at the discontinuity and do not increase the hiring of disabled workers when they cross it.

firms because the quota requires only large firms to hire disabled workers. Using a diff-in-diff approach comparing high- and low-exposure regions, I find that the quota for disabled workers increased wages and the labor-force participation of disabled workers. However, consistent with the results at the firm level, this came at the cost of reduced employment for non-disabled workers. Specifically, a one standard deviation increase in the exposure of a region to the quota increased the wages of disabled workers by 20% and their labor-force participation by 4.5 percentage points. However, it also led to a reduction in the employment of non-disabled workers by 2 percentage points and an increase in unemployment by 0.8 percentage points. These findings confirm that the quota for disabled workers promotes the participation of disabled workers but at the expense of lower economic activity.

I show that results are robust to adding several controls and taking into account other shocks hitting the Brazilian economy. In particular, I show that taking into account exposure to the China shock, to exchange rate fluctuations, or to the trade-liberalization does not change the results. Furthermore, the results are robust to controls capturing shocks to large firms, to the sectoral composition, to the occupational composition, or to states. Under all these different specifications, I still find that exposure to the quota for disabled workers increased employment and wages of disabled workers at the cost of lower economic activity for the non-disabled.

Using estimates of the effect of the quota on the firm and labor market, I identify the productivity of disabled workers and their labor supply elasticity. To calibrate disabled workers' productivity, I simulate the inspections of the quota in the model and calibrate the productivity of disabled workers to match the effect of inspections on firm size. Additionally, I allow the productivity of disabled workers to differ across sectors to capture the quota's heterogeneous effects. Furthermore, to calibrate the labor supply elasticity of disabled workers, I use the exposure of regions to the quota as an instrument for disabled workers' wages. I estimate the labor supply elasticity of disabled workers to be around 0.4, which is above the usual estimates for non-disabled workers.

Despite increasing the labor force participation of disabled workers, the quota decreased total employment, welfare, and government revenue. According to the counterfactual generated by the model, the labor force participation of disabled workers increased by 9% and

their wages by 2.5%. Moreover, the quota also increased the welfare of disabled workers by 2.5% in consumption equivalent terms. But, the benefit for disabled workers came at the cost of non-disabled workers, who had a decrease in wages by 1.3% and of employment by 0.47% with the quota. Moreover, the reduction in expenditure with disability insurance was not enough to cover the decrease in revenue from payroll taxes, because of that the government had to increase payroll taxes by 1.3%. Overall, the quota for disabled workers decreased welfare by 0.33%. Therefore, these results indicate that the quota for disabled workers is not a viable way to reduce the cost of disability insurance.

I explore the impact of subsidizing disabled workers, instead of a quota. In contrast to the quota, I find that a subsidy for disabled workers can increase welfare and after-tax wage even for non-disabled workers. By subsidizing disabled workers, the government can increase their labor force participation while simultaneously reducing the expenditure on disability insurance. Because the subsidy does not force firms from all sectors to hire disabled workers, disabled workers are going to sort into large firms in sectors where they are more productive, which will imply a small effect on the hiring of non-disabled workers. As a consequence, the government decreases its expenses with disability insurance which allows it to impose a smaller tax on non-disabled workers. I find the optimal subsidy for disabled workers to be of 10.3%, which would generate a welfare gain of 0.29% with an increase in the labor force participation of disabled workers by 64%. Therefore, these results indicate that a subsidy for disabled workers is a promising alternative to reduce the cost of disability insurance and promote labor market inclusion.

This paper relates to the literature studying quotas for disabled workers. Using different methods and studying different countries, the literature has shown that a quota for disabled workers increases the hiring of disabled workers but leads firms to decrease the hiring of non-disabled workers. Kreko and Telegdy (2022) find that the quota for disabled workers in Hungary increases the hiring of disabled workers but leads firms to bunch at the discontinuities. Barnay et al. (2019) show that firms prefer to pay fines rather than hiring disabled workers in France. Lalive et al. (2013) find that the quota for disabled workers in Austria increased employment of disabled workers by 12%, but firms manipulated the hiring of non-disabled workers to decrease the amount of disabled workers that they are required to hire.

Mori and Sakamoto (2018) find mixed effects of the quota for disabled workers in Japan on firm's revenue.[3]

This paper also relates to the literature studying size-dependent policies. Garicano et al. (2016) study size-dependent policies in France. They structurally estimate parameters of the model using the degree of bunching at discontinuities of policies. They find size-dependent labor regulation to cost about 3.4% of GDP. Caicedo et al. (2022) study an apprenticeship quota for large firms in Colombia. Using the bunching of firms around the kinks of the quota, they estimate the training cost of firms. They also show that, in a similar fashion to this paper, the program could be improved if it took into account the heterogeneity in training costs across sectors. Guner et al. (2018) and Guner et al. (2008) argue that a sizable difference in TFP between developed and developing countries can be accounted for by size-dependent policies.[4]

I propose a different method to identify the effect of size-dependent policies when enforcement is lacking. Different than many empirical papers studying size dependent policies, I don't find firms to bunch at the kinks of the quota for disabled workers, a feature which is common in several countries where this policy is implemented. Still, using variation from the inspection of the quota for disabled workers, I show that discontinuities in the requirement to hire disabled workers leads to a large employment adjustment. This shows that size-dependent policies can still cause large distortions even when they are only enforced in a few firms.

This paper relates to the literature studying the welfare consequences of different disability policies. DeLeire (2000) and Acemoglu and Angrist (2001) study the Americans with Disabilities Act (ADA), which requires employers to accommodate disabled workers and

[3] Malo and Pagán (2014) and Humer et al. (2007), who study the effect of the quota on the hiring of disabled workers in Spain and Austria, respectively. Peck (2017) studies a hiring quota for Saudi hiring in private Saudi Arabian firms. She shows that the policy led to an increase in the hiring of national at the cost of lower firm growth and higher exit rates. She finds that the program decreased total employment on the private sector by 948,000 workers. de Araújo et al. (2022) and Szerman (2023) study the quota for disabled workers in Brazil. Szerman (2023), in a follow up paper to this one, when studying all inspections finds that the quota does not lead to a decrease in employment of non-disabled workers, in contrast with the rest of the literature.

[4] Related work has also been done by Bachas et al. (2019), who show that tax enforcement and compliance vary with firm size in multiple countries, leading to loss of about 2% of TFP. Gourio and Roys (2014) find large discontinuities in firm size distribution in France due to size-dependent policies. They argue that removing these policies would increase output per worker by 0.3%.

outlaws discrimination based on disability. They show that the ADA reduced the hiring of disabled workers due to the increased firing and hiring costs. Kim and Rhee (2018) shows that the ADA led firms to become more selective when hiring disabled workers. Bell and Heitmueller (2009) studies the Disability Discrimination Act in Britain arguing that it possibly reduced the employment of disabled workers. Autor and Duggan (2003) finds that disability insurance take-up rates strongly responds to economic conditions. Kostol and Mogstad (2014), Wuellrich (2010), Gupta et al. (2015), and Baert (2016) study the effect of subsidizing disabled workers to join the labor force. Kostol and Mogstad (2014) finds that DI recipients have a considerable capacity to work and that the return-to-work program increased disposable income of disabled workers and decreased expenditure on disability insurance. Aizawa et al. (2020) develop a search model to understand how screening of disabled workers in the labor market interacts with the optimal provision of disability insurance. They show that the optimal provision of disability insurance depends on firms' screening incentives. They find that hiring subsidies can increase welfare up to 2% by correcting firms' screening distortions.

This paper is organized as follows. First, I discuss a model to understand the labor-market of disabled workers, their trade-offs, and the trade-off of firms. In section 3, I discuss the institutional details of the quota for disabled workers in Brazil. In section 4, I discuss the data. In section 5, I study the effects of the quota for disabled workers on firms and on the labor market. In section 6, I calibrate the model using the empirical estimates. In section 7, I discuss the quantitative results. Section 8 is the conclusion.

2 Model

This section presents a model to understand how a quota for disabled workers affects firms, workers, and the government. The model incorporates two key features. Firstly, it accounts for the possibility that disabled workers may have lower productivity compared to non-disabled workers for certain physically demanding tasks. Secondly, the model assumes that disabled workers who are not employed take disability insurance. Thus, if the government forces firms to hire disabled workers with a quota, it will reduce expenditure on disability insurance but increase the marginal cost of production of the firm. The net effect of the

quota will depend on the relative strength of these two channels.

Demographics. The economy is inhabited by a continuum of workers and firms. Workers can be disabled or non-disabled. They consume, receive disability insurance, and supply labor. Firms produce a homogeneous good using labor from disabled or non-disabled workers. The government taxes labor income, provide disability insurance, and impose a quota for disabled workers. Workers in this economy derive log-utility from their consumption but also experience disutility when they work. The profit π from firms is equally divided across workers.

Non-Disabled Workers. A fraction of $1 - \lambda_d$ workers are non-disabled. Non-disabled workers receive a wage of w_n, and experience disutility of $\gamma_i \sim Frechet(\mu_n)$ if they work, where μ_n is the labor supply elasticity of non-disabled workers. They join the labor force if

$$\log(w_n + \pi) - \gamma_i > \log(\pi)$$

Using that γ_i follows a Frechet distribution, I can write the labor supply of disabled workers as

$$\exp\left(\log(\pi) - \log(w_n + \pi)\right)^{-\mu_n}$$

Disabled Workers. A fraction of λ_d workers are disabled. Disabled workers receive a wage of w_d and experience disutility of $\gamma_i \sim Frechet(\mu_d)$ if they choose to work.[5] If a disabled worker chooses not to participate in the labor force, they receive disability insurance T. Therefore, disabled and non-disabled workers differ in their wages, labor supply elasticity, and disability insurance. A disabled worker i will join the labor force if

$$\log(w_d + \pi) - \gamma_i \geq \log(T + \pi)$$

[5] Differently from the US, where the Americans with Disability Act forbids firms to discriminate disabled workers, in multiple countries this is not the case. In Brazil, firms are allowed to post job ads only for disabled workers. On the data, conditional on sector and firm size, the wage of disabled workers is 14% lower.

From the utility maximization of disabled workers, their labor force participation is given by:

$$\exp(-(\log(w_d + \pi) - \log(T + \pi))^{-\mu_d}) \tag{1}$$

Government. The government imposes a marginal tax rate τ on labor income, provides disability insurance T, and has exogenous expenditure G. I assume that the government observes disability status.[6] In addition, the government requires firms to meet a quota for disabled workers. Specifically, a firm that hires n_j non-disabled workers must also employ at least $\bar{d}(n_j)$ disabled workers.

Tasks. Firms have to fulfill a measure one of tasks $x \in [0, 1]$ to produce. Let task $y(x)$ be the production of task x. The production function of firm j is then

$$Y_j = z_j \left[\left(\int y_j(x)^{\frac{\lambda-1}{\lambda}} dx \right)^{\frac{\lambda}{\lambda-1}} \right]^{\alpha}$$

where z_j is the TFP productivity of firm j, $y(x)$ is the production of task x by firm j, λ is the elasticity of substitution across tasks, and α is the degree of decreasing returns to scale.

The production of task x can be performed by either a disabled or a non-disabled worker. The productivity of a disabled worker for task x is x^{κ_j}, while the productivity of a non-disabled worker is 1. Therefore, κ_j measures the relative productivity of disabled workers. The rationale behind this is that some tasks, such as carrying heavy material or going up stairs, might be more challenging for disabled workers, but there could be other tasks where disabled workers perform as well as non-disabled workers.[7]

The production of task x is

$$y_j(x) = n_j(x) + x^{\kappa_j} d_j(x)$$

[6] In Section A.1, I discuss the strict definitions of disabilities imposed by the quota for disabled workers, which limits firms' ability to manipulate workers' disability status.

[7] Another possibility to model the productivity of disabled workers is to assume that there is a set of tasks that can be performed only by non-disabled workers, in the spirit of Acemoglu and Restrepo (2020). To keep the problem tractable and avoid corner solutions, I use the main functional form discussed in the paper.

where $n_j(x)$ and $d_j(x)$ are, respectively, the number of non-disabled and disabled workers allocated to task x by firm j.

Fixed Cost and Firm Heterogeneity. To hire disabled workers, firms must adapt their technology to accommodate them. I model this requirement as a fixed cost ξ_j that firms must pay in order to hire disabled workers.[8] I assume that firm heterogeneity is determined by a three-dimensional distribution:

$$(z_j, \kappa_j, \xi_j) \sim \Gamma$$

where z_j is the TFP productivity, κ_j is productivity of disabled workers, and ξ_j is the fixed cost of hiring disabled workers.

Firm's Problem. Due to the quota for disabled workers imposed by the government, $\bar{d}$, firms are required to hire a minimum amount of disabled workers. Firms have to satisfy

$$\int d_j(x)dx \geq \bar{d}\left(\int n_j(x)dx\right)$$

where $\int d_j(x)dx$ is the number of disabled workers hired at firm j and $\bar{d}\left(\int n_j(x)dx\right)$ is the number of disabled workers required by the quota from a firm with $\int n_j(x)dx$ able workers.

The problem of firm j is:

$$\max_{Y,y(x),n(x),d(x)} Y - \int (1+\tau)w_n n(x)dx - \int (1+\tau)w_d d(x)dx - \xi_j \mathbb{I}\left\{\int d(x)dx > 0\right\} \qquad (2)$$

s.t.

$$Y = z_j \left[\left(\int y(x)^{\frac{\lambda-1}{\lambda}}dx\right)^{\frac{\lambda}{\lambda-1}}\right]^{\alpha}$$

$$y(x) = n(x) + x^{\kappa}d(x)$$

$$\int d(x)dx \geq \bar{d}\left(\int n(x)dx\right)$$

[8] The fixed cost j also captures non-pecuniary costs of hiring disabled workers, such as prejudice.

2.1 Equilibrium

The labor market clearing condition requires the supply and the demand of workers to equalize:

$$(1-\lambda_d)\exp\left(\log(\pi)-\log(w_n+\pi)\right)^{-\mu_n}=\int_j\int_x n_j(x)dx \tag{3}$$

$$\lambda_d\exp(-(\log(w_d+\pi)-\log(T+\pi))^{-\mu})=\int_j\int_x d_j(x)dx \tag{4}$$

The budget constraint of the government is given by

$$\tau\left(w_n\int_j\int_x n_j(x)dx+w_d\int_j\int_x d_j(x)dx\right)=T\left(\lambda_d-\int_j\int_x d_j(x)dx\right)+G \tag{5}$$

where the left hand side is the revenue from payroll taxes and the right hand side is the total expenditure with disability insurance plus the exogenous expenditure G.

Given fiscal policy $\{\tau, T, d(.)\}$, an equilibrium is defined by a solution to the firm's problem 2, $\{Y_j, \{y_j(x), n_j(x), d_j(x)\}_{x\in[0,1]}\}$, prices, $\{w_n, w_d\}$, and a solution to the worker's problem such that the labor market clears and the government budget constraint is satisfied.

3 Institutional Setting

3.1 The Disability Quota

I study the quota for disabled workers established by the Brazilian federal government in 1999. According to this quota, companies with over 100 employees must have between 2% and 5% of their workforce comprised of disabled individuals. The primary objective of this program was to reduce the cost of disability insurance and facilitate the integration of disabled individuals into the labor market. Table 1 displays the required percentage of disabled workers, which increases proportionally with the size of the company's workforce.

The quota for disabled workers covers individuals with physical, auditory, visual, or cognitive disabilities. The law explicitly and precisely outlines the impairments that qualify an individual as disabled. This definition aims to ensure that companies are hiring workers

Table 1: Brazil Quota for Disabled Workers as Percentage of Labor Force

Firm Size	Quota for Disabled Workers
<100	0%
[100,200]	2%
[201,500]	3%
[5001,1000]	4%
>1001	5%

with lower work capacity who are more likely to require disability insurance. For example, the law specifies that "deformities that do not hinder job performance" should not be included in the disability quota. Appendix A.1 provides a detailed definition of physical, auditory, visual, and cognitive disabilities according to the quota for disabled workers.

3.2 Inspections of the Disability Quota

Despite the requirement, several firms choose not to respect the quota for disabled workers. According to 2010 CENSUS data, 30% of disabled workers in Brazil are working. If the quota for disabled workers were fully enforced, 52% of disabled workers should join the labor force. Therefore, inspections of the quota for disabled workers are a strong instrument to induce firms into hiring disabled workers. Figure 1 shows that firms increase the hiring of disabled workers only after being inspected.

Any labor regulation inspector in Brazil can enforce the quota for disabled workers. However, the Labor Ministry has a specialized division, the National Coordination for Combating Discrimination and Promoting Equality of Opportunities in the Workplace (NCCPEOW) responsible for enforcing this quota. Inspections of the quota follow a four-step process.[9]

First, the inspector selects a firm with over 100 employees. The selection of the firm is not random and is based on administrative estimates of the number of missing disabled workers, the firm's sector, and its distance from the inspector's headquarters. Firms with larger deficits of disabled workers, in less physically intense sectors, and closer to the inspector's headquarters are more likely to be selected for inspection. Due to lags on the release of administrative data, inspectors select firms based on their past outcomes. Given the data-

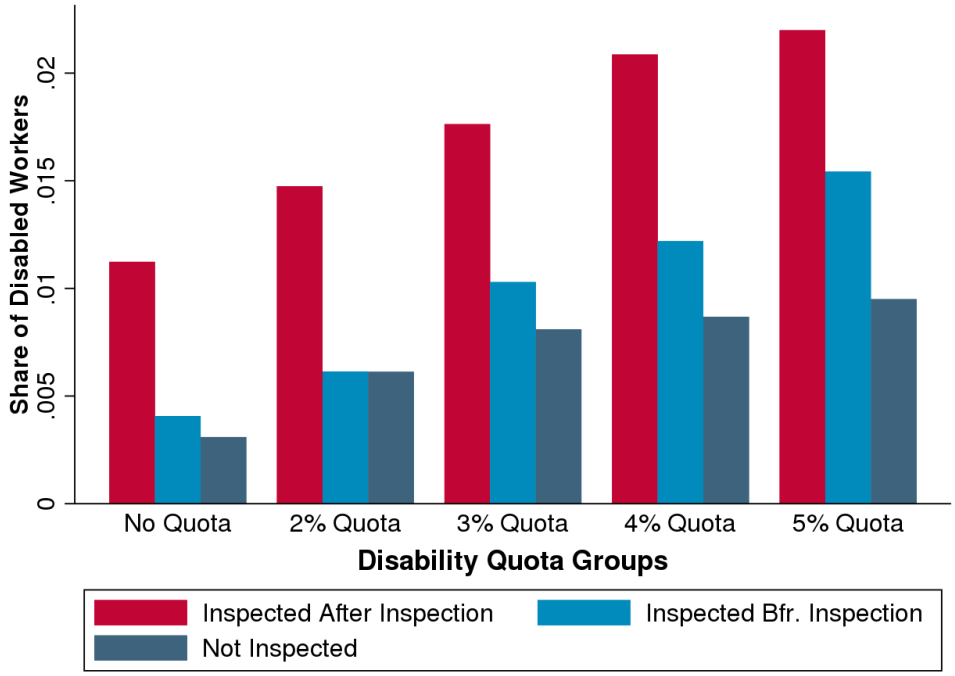
[9] It's portuguese name is "*Coordenação Nacional de Combate à Discriminação e Promoção da Igualdade de Oportunidades no Trabalho*".

intensive nature of this process, firms are generally pre-selected to be inspected at a later time.

After the firm is selected, the inspector contacts the firm and requests evidence that the firm is meeting the required quota of disabled workers. The firm is required to provide a list of disabled workers, a description of their disabilities, and proof of their disabilities. If the firm is not meeting the quota, it has 90 days to comply. If the firm still fails to meet the quota after 90 days, the inspector may choose to either fine the firm or provide it with a time extension. Time extensions are only granted to firms that can prove that they are actively seeking disabled workers. Once the inspection is completed, firms that have not met the quota are more likely to be visited by the inspector again in the future.

If a firm is found to be not meeting the quota during subsequent inspections, the inspector can impose a fine immediately. The fine amount varies from \$706 to \$70,645 per missing disabled worker and depends on the number of times that the firm has failed to comply with the quota and whether or not the firm has been actively seeking to fill the quota.

Figure 1: Disability Share



4 Data

Matched Employer-Employee Labor outcomes come from the administrative matched employer-employee dataset RAIS. The dataset has all formal firms in Brazil from 2005 to 2015. It includes information on worker characteristics such as wage, contractual hours, disability status, type of disability, years of education, and other demographic characteristics.

Census The federal government conducts a survey of the entire Brazilian population every 10 years. I use data from the censuses of 1991, 2000, and 2010. The census provides information on labor force participation, income, disability insurance recipients, government transfers, and disabilities. However, only three types of disabilities - auditive, visual, and cognitive - are consistently observed in the census. To proxy for individuals with physical disability, I use a dummy if a respondent reports difficulty walking. In the robustness section, I limit the sample only for the three disability types that I can consistently observe across census.

Inspections and Fines I obtain information on the universe of inspections of the quota for disabled workers realized by the NCCPEOW, the division of the Ministry of Labor that specializes in inspecting the quota for disabled workers. The data covers the period from 2002 to 2015, and for each inspection, I observe the name and tax ID of the firm, the number of disabled workers found, the number of disabled workers required, and the measures taken by the inspector. I also use data on all the labor market inspections realized by the Ministry of Labor and all the fines applied. For each inspection I observe the name and tax ID of the firm, a description of the labor infraction found, and a description of the measure taken by the inspector.

5 Empirics

This section identifies the effect of the quota for disabled workers on firm size, disabled workers' wages, and labor force participation. It is divided into two parts. Firstly, I investigate the effect of the quota on firms by using variation from inspections of the quota. The

NCCPEOW regularly inspects firms to enforce the disability quota, and approximately 13% of the investigated firms have fewer disabled workers than the quota requires. Firms that fail to comply must hire disabled workers within a short period to avoid fines, resulting in random variation in the implementation of the disability quota at the firm level.

In the second part, I examine the labor market effect of the quota for disabled workers. Although it is a nationwide policy, some regions are affected more than others. Regions with relatively larger firms face more exposure to the disability quota than those with smaller firms because the quota is proportional to firm size.

5.1 Effect of Disabled Quota on Firms

I identify the effect of the quota for disabled workers on firms by exploiting variations in the timing of inspections. As discussed in section 3, inspectors consistently target larger firms in specific sectors and regions, meaning that the inspection process is not entirely random. However, conditional on being inspected, the timing of the inspection does not correlate with firm-level characteristics. In fact, interviews with inspectors indicate that due to constraints in the number of inspectors, several firms are placed on a waitlist for inspection until inspectors become available.

5.1.1 Matching Firms

In this study, I conduct an event-study that compares firms inspected in the current period to similar firms inspected in the future. For each firm i that underwent its first inspection in year t, I match it with another firm j that was inspected at least two years later. I choose this short event window for two reasons. First, a shorter window allows for a larger group of potential control firms, which improves the quality of the match and increases the number of matched treatment firms. Second, longer horizons make the assumption of parallel trends between control and treatment groups less reasonable. Therefore, I match firms to control firms inspected two years later in the main part of the paper. In the robustness section, I demonstrate that the results are robust to this assumption.

I use Coarsed Exact Matching to match firms on age, sector, number of disabled workers,

and number of workers in the three years prior to the inspection. Matching on sector and age ensures that the results do not reflect differences in the life-cycle of firms or sector-level shocks. I match on the number of disabled workers and firm size to capture the number of disabled workers that must be hired as a result of the inspection.[10]

5.1.2 Validation

The identifying assumption is that firm-level shocks do not correlate with the timing of inspections, and I provide several pieces of evidence to support this assumption. I show that firm characteristics cannot predict when an inspection will occur or the probability of being inspected in the coming years. In the appendix, Table 11 shows that firm size, average wage, number of establishments, and other firm-level variables cannot predict when the first investigation will occur. Furthermore, Table 12 shows that firm dynamics cannot predict if an inspection will occur in the next five years. These findings suggest that inspectors do not target firms during a specific period of high growth.

Furthermore, inspections of the quota do not correlate with other labor inspections, political connections, public procurement, or subsidized loans, which supports the claim that inspections of the quota for disabled workers do not correlate with other firm-level shocks. In the appendix, Table 13 shows that inspections of the quota for disabled workers do not correlate with political connections, subsidized loans, or government procurement. Therefore, it is unlikely that inspections are political retaliation linked to other government policies.

Additionally, inspections of the quota for disabled workers do not correlate with other labor market inspections. The NCCPEOW specializes in enforcing the quota for disabled workers, meaning that inspectors do not enforce other labor market regulations. In the appendix, Table 13 shows that inspections of the quota for disabled workers do not correlate with other labor market infractions or inspections implemented by other departments of the Ministry of Labor.

[10] In the robustness section, I describe several alternative matching strategies. I have tried matching firms on regions or wages and workforce education. I have also used a 1-to-1 matching, alternative ranges of the matching period, and on not matching on the years directly leading to the investigation. The results are robust to these different matching strategies.

5.1.3 Empirical Model

The main empirical model consists of the following equation:

$$y_{i,p(i),t} = \beta \mathbb{I}_{i,t} \{Inspection\} + \delta_{p(i),t} + \mu_{p(i),t} + \mu_i + \epsilon_{i,t} \tag{6}$$

Here, $y_{i,p(i),t}$ represents an outcome of firm i, on matched-pair $p(i)$, in year t. The dummy variable $\mathbb{I}_{i,t}\{Inspection\}$ takes the value one after the first inspection received by firm i. For the control group, which is not inspected in the period of analysis, $\mathbb{I}_{i,t}\{Inspection\}$ is set to zero. The dummy variable $\mu_{p(i),t}$ takes the value 1 after the treatment firm in group $p(i)$ is investigated. It captures common trends between treatment and control in group $p(i)$. The term μ_i represents a firm fixed effect, and μ_t represents a year fixed effect. The sample is limited to five years before the first inspection and two years after.[11]

To test parallel trends in the pre-period, I use the following specification:

$$\begin{aligned} y_{i,p(i),t} = &\sum_{j=-5}^{2} \beta_j \mathbb{I}_{i,t} \{j \text{ } Yrs. \text{ } to \text{ } Inspection\} + \\ &\sum_{j=-5}^{2} \theta_j \mathbb{I}_{p(i),t} \{j \text{ } Yrs. \text{ } to \text{ } Inspection\} + \mu_i + \mu_t + \epsilon_{i,t} \end{aligned} \tag{7}$$

Here, $\mathbb{I}_{i,t} \{j \text{ } Yrs. \text{ } to \text{ } Inspection\}$ is a dummy variable that takes the value 1 if it has been j years since the first inspection of firm i. Similarly, $\mathbb{I}_{i,t} \{j \text{ } Yrs. \text{ } to \text{ } Inspection\}$ is a set of dummies that lead to the first investigation among match group $p(i)$. The assumption of parallel trends in the pre-period requires that $\beta_j = 0$ if $j < 0$. The match is constructed such that $\beta_j = 0, j \in [-3, -1]$, but the first two years are not matched, allowing for the evaluation of the assumption of parallel trends.

5.1.4 Results

5.1.5 Hiring of Disabled Workers

As an effect of the inspection, firms strongly increase the hiring of disabled workers, as shown in figures 2a and 2b. Figure 2a shows the coefficients of model 7 on the log number of disabled

[11] In the appendix, I test the robustness of the results to several windows of analysis.

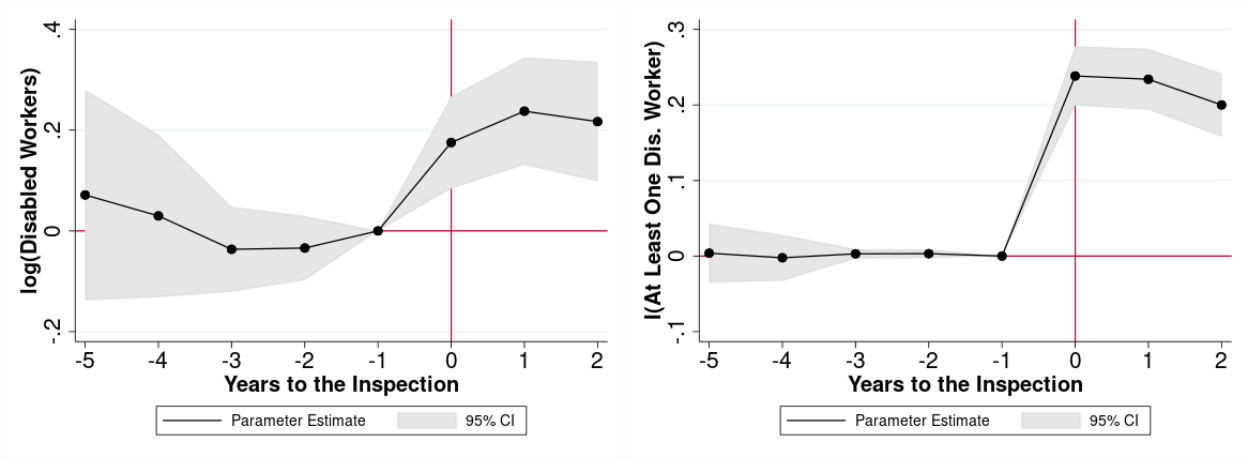
Table 2: Effect of Inspection of the Quota for Disabled Workers on the Firm

	(1)	(2)	(3)	(4)	(5)	(6)
	log(N. Dis. Workers)	$\mathbb{I}\{\geq$ *One Dis. Worker*$\}$	$\mathbb{I}\{$*Satisfy Quota*$\}$	*log(N. Workers)*	*log(N. Not Dis. Workers)*	$\mathbb{I}\{$*Decrease Group Quota*$\}$
$\mathbb{I}\{$*Inspection*$\}$	0.207***	0.224***	0.142***	-0.0307**	-0.0419***	0.0186***
	(0.0562)	(0.0159)	(0.0170)	(0.0140)	(0.0145)	(0.00703)
N	6377	11336	11336	11336	11336	11336
R^2	0.850	0.818	0.578	0.974	0.968	0.226
Mean Dep. Var	2.406	.547	.219	5.985	5.972	.036
Mean Ind. Var	.16	.16	.16	.16	.16	.16

workers. Before the inspection, control and treatment groups have similar number of disabled workers, even for non-matched years. But after the inspection, there is a large increase in the number of disabled workers at the inspected firm. Two years after the inspection, the number of disabled workers at the firm increases by 20%.

Figure 2: **Inspection and Hiring of Disabled Workers**

(a) **Number of Disabled Workers** (b) **At Least One Disabled Worker**



Inspections also led to an increase in adherence to the quota. Table 2 shows that, on average, firms increased the hiring of disabled workers by 20% and increased the probability of satisfying the quota by 14%.

Inspections led to the hiring of workers with all types of disability, with weakly lower wages, and with higher probability of being assigned to physical tasks. Tables 14 and 15 in the appendix show that the hiring of workers with all disability types has increased. Table 16 shows that the inspection led firms to hire disabled workers with wages weakly lower than the ones hired before the inspection. Moreover, the disabled workers hired after the inspection were more likely to be assigned to occupations intensive in physical, routine, and manual tasks, which suggests the disabled workers hired after an inspection are being assigned to

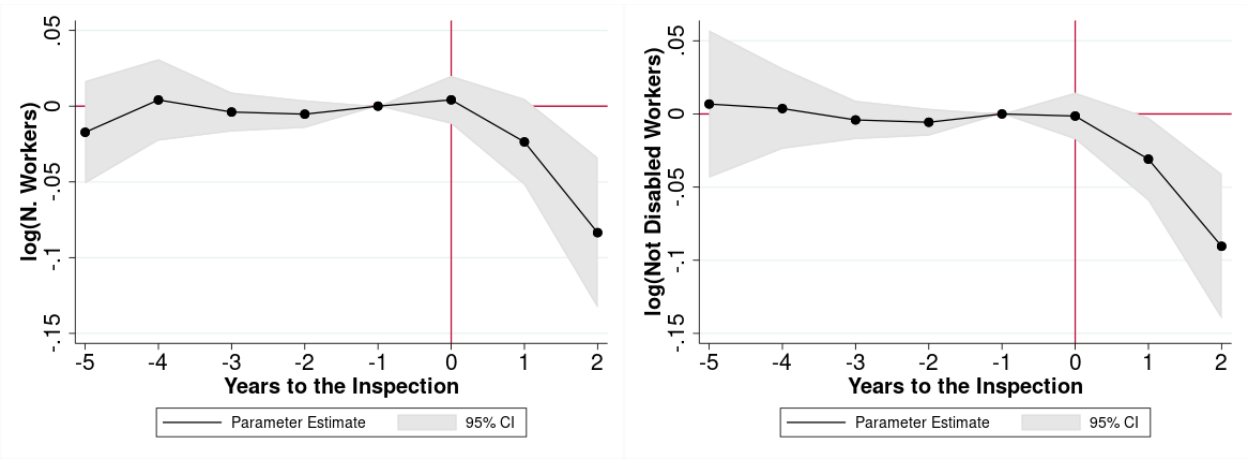
tasks in which they have low productivity.

5.1.6 Firm Size

Despite increasing the number of disabled workers, the firm reduces its overall size to minimize the number of disabled workers it is required to hire. The impact of inspections on the disabled worker quota and employment is presented in Figure 3 and Table 2. The data in column 4 of Table 3 indicates that after an inspection, the number of workers at the firm drops by 3%. This reduction in employment is mainly due to a decrease of 4% in the number of non-disabled workers at the firm.

Figure 3: **Inspection and Hiring of Disabled Workers**

(a) **Number of Workers** (b) **Number of Non-Disabled Workers**



To reduce the number of disabled workers they are required to hire, firms are decreasing their size, resulting in a significant impact of inspections on firm size, as indicated in Table 18. After the inspection, the total number of disabled workers that firms are required to hire decreases by 3.7%. Firms achieve this reduction by going down on the discontinuities of the quota for disabled workers, decreasing the percentage of disabled workers that they have to hire, and by avoiding becoming large enough to have to increase the percentage of disabled workers in their workforce, illustrated in Columns 2 and 3.

Moreover, firms primarily meet the quota by reducing the share of disabled workers they are required to hire. Column 4 of Table 18 shows the effect of inspections on a dummy that takes the value of one if the firms satisfies the share of disabled workers that they were

required to hire the year before the firm was inspected. Table 18 indicates that an inspection only increases the probability that a firm satisfies the past quota by 6%. However, according to Table 2, an inspection increases the probability that a firm satisfies the quota by 14%. Therefore, firms are more likely to meet the quota by downsizing until they are required to employ a smaller percentage of disabled workers in their workforce. This result helps rationalize the large effect of inspections on firm size and shows that discontinuities on the quota for disabled workers can generate large distortions at firms.

Because firms may partially satisfy the quota by reducing their size, the decrease in firm size after an inspection should be more significant among firms closer to a discontinuity than for those far away from it. Table 19 examines the effects of the inspection on firms close and far from the discontinuities.[12] My results show that after an inspection, firms closer to the discontinuity decrease employment by 6% and their wage bill by 9%. In contrast, the effect of an inspection on firms far from the discontinuity is not statistically significant.

Inspections of the quota for disabled workers also negatively affects wages and educational composition of firms, not only their size. Table 17 in the appendix shows that the quota led to a decrease of 5% in wage bill, with hourly wages decreasing by 5%. Table 17 also shows that there is a large drop in the wage-bill of new hires, that firms decrease the average years of education of its workforce, and that the quota does not affect the number of establishments of the firm.

As shown in Figure 4, the effect of the quota varies greatly across sectors, indicating a high degree of heterogeneity in the productivity of disabled workers across sectors. Sectors with physically intensive tasks, such as agriculture and retail, tend to have a greater reduction in employment than those with less physically intensive tasks, such as manufacturing and education. Interestingly, inspections have a significant impact on employment in ICT, which could be attributed to the sector's high level of technical or high-skill intensity, as there may be a lack of suitable technologies that could incorporate disabled workers.

[12] I define a firm as close to the discontinuity if the percentage change in employment to the nearest lower discontinuity is in the lowest quartile. A firm is considered far from the discontinuity if the percentage change in employment to the nearest lower discontinuity is in the top quartile.

5.1.7 Robustness

Based on the results of the previous section, inspections of the quota for disabled workers led to an increase in disabled workers' hiring, but a decrease in firm size. I show that these findings hold up to alternative specifications and identification strategies. In particular, I show that the results are robust to adding controls, matching on long horizons, and matching on other firm characteristics. I also propose an alternative matching strategy exploiting the information available to inspectors. Additionally, I propose a new identification strategy that exploits variation in the strictness of inspectors. In all these different empirical strategies, I still find that inspections of the quota for disabled workers led to an increase in the hiring of disabled workers but a decrease in firm size.

Controls Table 20 shows that the results are robust to adding or removing controls. Results are robust to adding a 2-digit sector-year fixed effect, which captures sector-level shocks, and municipality-level fixed effects.

Matching on Long Horizon Table 21 shows the effect of inspections under different matching windows. Treatment and control firms are matched on the three to five years leading to the inspection. Results are still the same: the inspection leads to large increases in the hiring of disabled workers and lower firm size.

Table 22 shows the estimates of the effect of an inspection of the quota for disabled workers requiring control firms to be inspected up to five years after the treatment firms. The estimated effect of the quota is larger but less precisely estimated, which is expected because less treated firms are being matched to control ones and because treated firms are receiving multiple visits from inspectors.

Matching on Other Firm Characteristics Results are robust to matching firms in other labor market outcomes. In Table 23, I show the estimates of the effect of the quota matching treated and control firms also on their hourly wage, number of establishments, share of high-school dropouts, sector, employment, number of disabled workers, and age in the three years before the inspection. The number of successful matches decreases substantially which

reduces the sample and increases standard errors. Still, I still find that the quota increased the hiring of disabled workers and decreased firm size by 2.1%, not statistically differently from the findings on the baseline specification.

Lagged Match Inspectors select firms using lagged firm information. Specifically, inspectors use RAIS to select firms, which usually comes with a three-years lag. Inspired by this, I match firms using only labor outcome of firms that are in the information set of inspectors. I reproduce equation 8 but match treatment and control firms on outcomes five to two years before the inspection. This robustness test is especially important because it allows me to test if parallel trends hold in the 2 years closest to the inspection, which once again would validate the identifying assumption that inspectors are not targeting high-growth firms.

Figure 8 shows the dynamic estimates of the effect of inspections on the number of disabled workers and on employment. Despite matching on firm's outcomes five to three years before the inspection, treatment and control groups have similar numbers of disabled workers and employment in the two years before the inspection. After the inspection, employment of disabled workers significantly increased at the treated firms while total employment decreased. Table 26 shows that, on average, inspected firms decrease employment by 2.6% and increase the hiring of disabled workers by 34%.

Judge Instrument As discussed in section 3, inspectors have a fair amount of discretion on enforcing the quota for disabled workers. Therefore, stricter inspectors, who are more likely to treat firms with high fines and require them to satisfy the quota, should then lead firms to hire more disabled workers and cause more distortions on firms' employment choices. Inspired by Kling (2006), French and Song (2014), Autor et al. (2019), among many others, I use a judge instrument to show that inspections of the quota of disabled workers increase employment of disabled workers but decrease firm size.

I first determine the strictness of each inspector. To do so, I run the following auxiliary regression

$$\mathbb{I}_{i,p(i),t}\left\{Satisfy\ Quota\right\} = \theta_e \mathbb{I}_{i,t}\left\{Inspection\right\} + \delta_{p(i),t} + \mu_{p(i),t} + \mu_i + \epsilon_{i,t}$$

where $\mathbb{I}_{i,p(i),t}\{Satisfy\ Quota\}$ is a dummy taking one if firm i in matched-pair $p(i)$ satisfies the quota for disabled workers in year t, $\mathbb{I}i,t\{Inspection\}$ is a dummy taking one for firm i's first inspection, $\delta_{p(i),t}$ is a dummy taking one after the treated firm in group $p(i)$ is inspected, $\mu_{p(i),t}$ is a year-matched-pair fixed effect, and μ_i is a firm fixed effect. I allow the effect of an inspection on the probability of a firm satisfying the quota, θ_e, to vary according to the inspector. β_e captures the strictness of the inspector.

Using the estimates of inspector strictness, I run the following regression

$$y_{i,p(i),t} = \beta\theta_e\mathbb{I}_{i,t}\{Inspection\} + \delta_{p(i),t} + \mu_{p(i),t} + \mu_i + \epsilon_{i,t} \tag{8}$$

where the parameter β captures the effect on firm $y_{i,p(i),t}$ of being inspected by a stricter inspector. Table 25 in the appendix shows the effect of being inspected by a stricter inspector. As expected, firms inspected by stricter inspectors decrease employment by more and hire more disabled workers as consequence of the inspection.

5.2 Effect of Disabled Quota on Labor Market

Firm-level regressions fail to consider the broader impact of the quota for disabled workers on the economy. By analyzing only firm-level variation, I cannot determine how the quota affects labor force participation, wages, or disability insurance take-up rates, all of which are vital considerations for policymakers and to calibrate the model. In this section, I exploit heterogeneous exposure to the quota for disabled workers across labor markets to understand how it affected wages and the labor force participation of disabled workers.

Although the quota for disabled workers is a national policy, its impact across regions varied depending on the size of firms in each region. The quota only applies to firms with more than 100 workers, meaning that regions in which employment is concentrated among few large firms are more exposed to the quota than regions with several small firms. Consequently, the effect of the quota for disabled workers is heterogeneous across labor markets, with heterogeneity depending on the firm size distribution.

I measure the exposure of region r to the quota for disabled workers as

$$exposure_r = \frac{\#\ Disabled\ Required_{r,91}}{Population_{r,91}} \tag{9}$$

where $\#\ Disabled\ Required_{r,91}$ is the number of disabled workers required by the quota for disabled workers in region r in 1991. $Population_{r,91}$ is the population in region r in 1991. Figure 5 shows the distribution of $exposure_r$.[13]

The main empirical model to identify the effect of the disability quota on the labor market is given by

$$y_{r,t} = \theta \times exposure_r \times \mathbb{I}\{t \geq 2000\} + X'_{r,t}\alpha + \mu_t + \mu_r + \epsilon_{i,r,t} \tag{10}$$

where $y_{i,r,t}$ is an outcome of region r in year t. The variable $exposure_r$ captures the relative demand for disabled workers created by the quota law, $\mathbb{I}\{t \geq 2000\}$ is a dummy taking 1 after the creation of the disability quota, $X_{i,r,t}$ is a set of controls, μ_t is a time fixed effect and μ_r is a region fixed effect.[14] To facilitate interpretation, I normalize the exposure measure to have mean zero and standard variation of 1.

The parameter of interest is θ. It captures the effect of exposure to the quota for disabled workers on outcome $y_{i,t}$. As is common in differences-in-differences, the identifying assumption is that high- and low-exposure regions have parallel trends. To test for parallel trends in the pre-period, I use the following dynamic model

$$y_{r,t} = \kappa_t \times exposure_r + X'_{r,t}\alpha + \mu_t + \mu_r + \epsilon_{i,r,t} \tag{11}$$

where κ_t is the effect of exposure to the quota on labor market outcomes in year t, $t \in \{1980, 1991, 2000, 2010\}$. If parallel trends in the pre-period hold, $\kappa_t \approx 0, \forall t \leq 1991$.

[13] To calculate the number of disabled workers required in each region, I need to make assumptions about the allocation of disabled workers within multi-establishment firms. In the main part of the paper, I assume that multi-establishment firms distribute disabled workers in proportion to their number of disabled workers across regions. In the robustness section, I show that this assumption does not affect the results.

[14] As controls, I use the average firm size in 1991 and the outcome variable in 1991, $y_{r,91}$, interacted with year fixed effects.

5.3 Effect on the Labor Market

I start by studying the effect of the quota for disabled workers on the labor market, including disabled and non-disabled workers. The quota for disabled workers decreased employment and social security contributions, while increasing the unemployment rate, consistent with the firm-level effect. The estimates of the dynamic model (shown in Figure 6a) reveal that regions with higher exposure to the quota experienced a decline in employment rates compared to those with lower exposure. Prior to the quota's introduction in 1991, both groups exhibited similar employment trends. However, after its implementation, the difference between the two groups became apparent. As of 2010, which marks 19 years since the quota's creation, regions with one standard deviation more exposure to the quota experienced a decrease in the employment rate by 2 percentage points.

Figures 6b and 6c show that the quota for disabled workers led to an increase in unemployment and a decrease in social security contributions. Before the introduction of the quota, regions had similar trends in unemployment and social security contributions, as highlighted in these figures. However, after the quota was introduced, there was a sharp increase in unemployment rates. Because the share of unemployed workers increased, the number of individuals making social security contributions decreased.

Table 3 presents the main estimates, indicating that for every one standard deviation increase in the exposure to the quota for disabled workers, employment decreased by 2 percentage points and unemployment increased by 0.8 percentage points.

Table 3: Effect of Quota for Disabled Workers on the Labor Market

	(1) Employment Rate	(2) Unemployment Rate	(3) Labor Force	(4) Shr. SSC Contrib.	(5) log(Income)
exposure	-0.0201***	0.00883***	-0.000432	-0.0128**	0.0283***
	(0.00384)	(0.00263)	(0.00210)	(0.00570)	(0.00604)
N	2211	2211	2211	2211	1671
R^2	0.961	0.986	0.922	0.972	0.999
# Regions	557	557	557	557	557
Mean Dep. Var	.459	.322	.684	.36	8.059

5.4 Effect on the Labor Market of Disabled Workers

Now I limit the sample only to disabled workers, showing that the quota had a significant impact on the labor market of disabled workers, increasing their employment rate, labor force participation, and wages, according to results in Table 4. Column 1 of Table 4 provides an estimate of Model 10 on the employment rate of disabled workers. According to these results, increasing exposure to the quota by one standard deviation increased the employment of disabled workers by 4.5 percentage points.

Columns 2 and 3 of Table 4 indicate that the quota also led to a decrease in the unemployment rate and an increase in labor force participation among disabled workers. As a result, there was a decrease in work-age retirement among disabled workers and an increase in social security contributions.

Finally, Column 6 of Table 4 shows that the increased demand for disabled workers also had a positive impact on their wages. Specifically, a one standard deviation increase in the exposure to the quota led to a 19.8% increase in the income of disabled workers.

Table 4: Effect of Quota for Disabled Workers on the Labor Market of Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment Rate	Unemployment Rate	Labor Force	Work-Age Retirement	Shr. SSC Contrib.	log(Income)
exposure	0.0454***	-0.0362***	0.0310***	-0.0306***	0.123***	0.198***
	(0.00644)	(0.00595)	(0.00353)	(0.00336)	(0.0129)	(0.0235)
N	1516	1516	1664	1664	1575	1571
R^2	0.888	0.895	0.796	0.825	0.838	0.986
# Regions	506	506	555	555	526	524
Mean Dep. Var	.588	.393	.25	.289	.408	7.586

5.5 Robustness

The quota for disabled workers increased employment and labor force participation among disabled workers, but at the expense of non-disabled workers. I also show that this finding remains valid even when using alternative exposure measures and adding controls, as well as with different definitions of disability.

Controls. The results are robust even when adding various controls, as shown in Table 27 in the appendix. In column 2 of Table 27, to control for possibles shocks that correlate

with firm-size distribution, I add as controls the average firm size and the standard deviation of firm size distribution in 1991 interacted with year. For the same reason, in column 3 I control for a polynomial on average firm size and on the standard deviation of firm size in 1991. Because results are not affected by accounting for firm size distribution, I conclude that results are not driven by shocks affecting large firms.

In columns 4 and 5 of Table 27, I control for the share of workers in different occupations and for sectoral GDP, respectively. These controls have the objective of accounting for any sectoral or occupational shocks.[15] I still find that the quota increased employment of disabled workers and decreased employment of non-disabled workers.

In column 6 I add as a control a state-year fixed effect, which has the objective of capturing any state-level shock. I once again find that the quota decreased employment of non-disabled workers and increased employment of disabled workers. But, the point estimate of the effect on non-disabled workers is much smaller and less precisely estimated.

Finally, in the last column, all the controls discussed are added. Despite adding an unreasonable number of controls and losing a lot of variation, I still find that the quota for disabled workers significantly increased the employment of disabled workers and decreased the employment of non-disabled workers.

Alternative Exposure Measures. I present evidence of the robustness of the results to different definitions of exposure to the quota for disabled workers in Tables 28 and 29. I examine three alternative measures of exposure.

Firstly, instead of using all firms in a region to calculate the number of disabled workers required to be hired by the quota, I use only those firms that have all their establishments in one region. By limiting the sample to these firms, I can test if assumptions about the allocation of disabled workers within multi-establishment firms influence the results.

Secondly, I use the logarithm of the number of disabled workers required to be hired in each region as an alternative exposure measure. Lastly, in the third alternative exposure measure, I normalize the demand for disabled workers calculated by the quota by the number of disabled workers in the region, rather than the total population.

[15] I control for the share of workers in each one-digit CBO91 classification and GDP of agriculture, manufacturing, and service sectors.

Tables 28 and 29 reveal that, regardless of the exposure measure used, a larger exposure to the quota for disabled workers leads to a decrease in the overall employment rate and social security contribution, while increasing labor force participation and employment of disabled workers.

Alternative Definition of Disability. As mentioned in section 4, the census data does not provide information on whether individuals have a physical disability. Therefore, I use a dummy variable based on whether individuals have difficulty walking as a proxy for physical disability. In Table 30, I restrict the sample to individuals with auditive, visual, or cognitive disabilities. Despite this sample restriction, the results remain unchanged.

Mobility or Self-Identification. Table 30 in column 7 shows that the quota has not increased the number of individuals identifying as disabled in a region.

6 Calibration and Identification of Model Parameters

The calibration process involves four strategies. First, I calibrate parameters related to the government and production function using standard numbers from the literature. Second, I estimate the labor supply elasticity of disabled workers by exploiting their heterogeneous exposure to the quota, as explained in section 5.2. I assume that the quota only affected disabled workers' labor force participation through wages.[16] Third, I calibrate the productivity of disabled workers by matching the effect of inspections of the quota on firm size, as discussed in section 5.1. In the model, an inspection represents a sudden implementation of the quota at the firm level. Finally, I identify the distribution of firms' TFP and fixed costs by targeting firms with less than 95 workers, which are not directly affected by the quota.

It's important to note that I don't model the enforcement of the quota or a firm's decision to comply with it. The reason is that endogeneizing this margin is not necessary to calibrate the model nor for the counterfactual of interest. To calibrate the labor supply elasticity of disabled workers, I need an exogenous shifter of wages of disabled workers, as in de Souza

[16] It's worth noting that this assumption does not exclude the possibility of discrimination against disabled workers, as their labor supply curve is still valid even if they receive lower wages due to discrimination.

and Li (2022) and Eckert (2019). Therefore, the enforcement structure in the model does not affect the calibration of the elasticity. To calibrate the productivity of disabled workers, I need to assume what happens at inspected firms in a narrow window around the inspection, rather than their future decisions regarding the quota. Lastly, I can calibrate the parameters governing the firm size distribution by targeting firms well below the quota threshold, which are not affected by the quota or its implementation. I decided not to add assumptions on enforcement to the model, as they are not necessary for calibration and do not produce interesting counterfactuals.

Labor Supply Elasticity. I calibrate the labor supply elasticity to reproduce the impact of the quota for disabled workers on wages and on the labor-force participation of disabled workers. Using equation 1, we can express the labor force participation of disabled workers as:

$$\log\left(\text{labor force disabled}\right) = \mu_d \log\left(w_d + \pi\right) - \mu_d \log\left(T + \pi\right) \approx \mu_d \log\left(w_d\right) + H(\pi, T) \quad (12)$$

where H is a function of π and T. Assuming that the quota for disabled workers only affects aggregate profit, and not regional profits, $X(\pi, T)$is absorbed by the fixed effect, and the introduction of the quota only affects the labor force participation of disabled workers through wages. Therefore, I can use the exposure measure in 9 as an instrument for labor force participation to identify the labor supply elasticity of disabled workers. The empirical counterpart of equation 12 is:

$$\log\left(\text{labor force disabled}_{r,t}\right) = \mu_d \log\left(w_{d,r,t}\right) + X_{r,t} + \mu_t + \mu_r + \epsilon_{r,t} \quad (13)$$

Here, labor force disabled$_{r,t}$ is the labor force participation of disabled workers in region r and year t, μ_t is a time fixed effect that absorbs variations in $H(\pi, T)$, μ_r is a region fixed effect, and $\epsilon_{r,t}$ is the residual.

Table 5 shows the estimates of equation 13 under different specifications using the exposure measure 12 as an instrument for the wages of disabled workers. The estimated elasticity varies from 0.41 to 0.29. In the main part of the paper, I assume it to be 0.4.

Table 5: Labor Supply Elasticity of Disabled Workers

	(1)	(2)	(3)	(4)	(5)
	log (labor force disabled)	log (labor force disabled)	log (labor force disabled)	log (labor force disabled)	log (labor force disabled)
$log(w_d)$	0.419***	0.347***	0.405***	0.390***	0.297***
	(0.0673)	(0.0786)	(0.0619)	(0.0861)	(0.0871)
N	1159	1146	1159	1159	1146
Controls	Baseline	State-Year FE	Firm Size Std.	Occupation Distribution	All Others

I calibrate the labor supply elasticity of non-disabled workers following the literature. According to Chetty et al. (2011), the micro estimates of the labor supply elasticity are around 0.2.

Government. The government's fiscal policy parameters include the payroll tax τ, disability insurance T, exogenous expenditure G, and the quota for disabled workers $\bar{d}$. To calibrate τ, I match the ratio of fiscal revenue to GDP in Brazil, which is 0.32. T is calibrated to match the average income of disabled workers who were not working in 2010, R$ 250. The exogenous expenditure G is calibrated as the residual between the revenue generated by payroll tax τ and the expenditure with the disability insurance, T. The function $\bar{d}$ is set to match the quota for disabled workers in Brazil:

$$\bar{d}(n+d) = \begin{cases} 0, \text{ if } n+d \in [0, 100) \\ 0.02\,(d+n)\,, \text{ if } n+d \in [100, 200) \\ 0.03\,(d+n)\,, \text{ if } n+d \in [200, 500) \\ 0.04\,(d+n)\,, \text{ if } n+d \in [500, 1000) \\ 0.05\,(d+n)\,, \text{ if } n+d \in [1000, \infty) \end{cases} \tag{14}$$

As discussed before, the quota for disabled workers is widely disregarded by firms. To reflect this in the baseline economy, I assume that the quota is only enforced for the fraction of firms that are inspected, which corresponds to 1.89% of firms with more than 100 workers.

Production Parameters. I calibrate α, the degree of decreasing returns to scale, following de Souza (2022), who estimates a production function for Brazil using standard methods in the literature. The elasticity of substitution across tasks, λ, is calibrated to zero following

Acemoglu and Restrepo (2020).

Firm Heterogeneity. I assume that each firm j belongs to a sector $s(j)$, and I calibrate the distribution Γ to match the firm size distribution in each sector. Specifically, I assume that z_j, the firm's TFP, ξ_j, the fixed cost to hire disabled workers, and κ_j, the productivity of disabled workers, are independently distributed within sectors. More precisely,

$$\log(z_j) \sim N\left(\mu_{z,s(j)}, \sigma_{z,s(j)}\right) \qquad\qquad \xi_j \sim Exp\left(\sigma_{\xi,s(j)}\right)$$

I calibrate $\mu_{z,s(j)}$ and $\sigma_{z,s(j)}$ to match the average and variance of firm size for firms with fewer than 95 workers. Since I do not model the decision of firms to comply with the quota, I cannot use the full firm size distribution as targets because the model should not be capable of generating that. However, given wages, the distribution of firms located far from the cutoff of the quota for disabled workers should not be affected by it.

Table 7 shows the targets and calibrated parameters. I do not report the statistics generated by the model, as they match the data exactly.

Disabled Worker Productivity. I calibrate the productivity of disabled workers to reproduce the estimated effect of inspections on the firm. Given a guess for the parameters governing firm heterogeneity and wages calibrated to match the data, I solve the firm's problem with and without the quota for disabled workers. Then, I assume that a sample of firms with more than 100 workers are inspected and are forced to satisfy the quota. Therefore, their labor demand changes from the unconstrained demand for workers to the one that satisfies the quota for disabled workers. Then, I calculate for each firm the change in the employment of non-disabled workers:

$$\beta_{s,model}(\kappa_s) = E\left(\log(n_{j,unconstrained}) - \log(n_{j,constrained}) | s(j) = s, \kappa_s\right)$$

where $n_{j,unconstrained}$ is the demand for non-disabled workers when firm j is not constrained by the quota for disabled workers and $n_{j,constrained}$ is the demand for non-disabled workers that solves problem 2. I choose κ_s such that $\beta_{s,model}(\kappa_s)$ matches the estimates in 4.

Summary of Identification Table 6 summarizes the calibrated and identified model parameters.

7 Quantitative Result

In this section I describe the main results of the paper. I am interested in understanding the macroeconomic effects of two policies - the quota for disabled workers and an alternative policy that subsidises the hiring of disabled workers. I show that the quota for disabled workers benefits them at the cost of reduced firm size and lower welfare of non-disabled workers due to the low productivity of disabled workers at some sectors. A subsidy, on the other hand, would allow disabled workers to select into sectors where they are more productive and can increase overall welfare.

7.1 Effect of the Quota for Disabled Workers

Effect of Full-Enforcement of the Quota for Disabled Workers The results in table 8 indicate that the quota for disabled workers achieved its intended goal of increasing the hiring of disabled workers, but at the expense of reduced government revenue and economic activity. Specifically, Table 3 compares the baseline economy to the counterfactual economy without a quota for disabled workers and to the counterfactual economy with full enforcement of the quota.

One key takeaway from Table 8 is that a quota for disabled workers decreases GDP, consumption, and firm size. This occurs because, on average, disabled workers are less productive than non-disabled workers. Consequently, forcing firms to hire disabled workers increases firms' marginal costs and fixed costs, resulting in smaller firms that produce less, lower wages, and less consumption.

Nonetheless, the quota for disabled workers successfully increases the labor force participation of disabled workers. Table 8 shows that, with full enforcement, the share of firms hiring disabled workers would increase by 134% compared to the baseline economy, and the labor force participation of disabled workers would increase by 9.3%. This result suggests that, despite disabled workers being less productive than non-disabled workers, this differ-

Table 6: Summary of Identification and Calibration

Parameter	Description	Calibration Method	Source	Value
		Labor Supply Elasticity		
μ_d	Labor supply elasticity of disabled workers	Using the quota as instrument for wages in 12	Table 5	0.4
μ_n	Labor supply elasticity of non-disabled workers	Literature	Chetty et al. (2011)	0.1
		Production		
α	degree of decreasing returns to scale	Literature	de Souza (2022)	0.7577
λ	elasticity of substitution across tasks	Literature	Acemoglu and Restrepo (2020)	0
		Government		
τ	payroll taxes	Tax revenue as share of GDP	National Treasury	0.3229
T	disability insurance	Income of disabled workers outside of the labor-force	2010 Census	250
G	exogenous expenditure of the gov	Difference between revenue and expenditure with disability insurance	Calibration	4.38E+10
$\bar{d}(.)$	quota for disabled workers	Quota for disabled workers in Brazil		Equation 14
		Firm Heterogeneity		
$\mu_{z,s}$	Average of firm's productivity	Match average firm size of firms with less than 95 workers	Table 7	Table 7
$\sigma_{z,s}$	Variance of firms's productivity	Match variance of firm size of firms with less than 95 workers	Table 7	Table 7
$\sigma_{\xi,s}$	Rate parameter of fixed cost of hiring disabled workers	Match share of firms with less than 95 workers hiring disabled workers	Table 7	Table 7
		Productivity of Disabled Workers		
κ_s	Sector specific productivity of disabled workers	Match effect of quota inspections by sector	Table 7	Table 7

Table 7: Summary of Identification and Calibration

Sector	Avg. Firm Size	Std. Firm Size	Shr. Disabled	$\mu_{z,s}$	$\sigma_{z,s}$	$\sigma_{\xi,s}$
Agriculture	11.05	17.16	1.26%	7.865	0.480	1.35E-02
Extractive	9.11	14.26	1.01%	7.826	0.391	1.21E-02
Manufacturing	11.03	15.27	1.25%	7.915	0.352	4.95E-06
Utilities	10.38	14.61	1.34%	7.896	0.348	1.61E-02
Construction	18.47	20.97	5.56%	8.120	0.398	1.30E-03
Retail	11.66	16.46	1.05%	7.918	0.390	9.27E-03
Transportation	5.20	8.27	0.69%	7.725	0.306	1.00E-07
Hospitality	7.08	9.86	0.70%	7.829	0.286	1.00E-07
ICT	7.13	12.59	0.78%	7.726	0.412	8.04E-03
Prof. Services	6.93	11.56	0.82%	7.755	0.364	3.03E-06
Education	6.68	12.21	0.68%	7.699	0.418	1.20E-06
Others	6.48	11.03	0.82%	7.736	0.361	3.06E-06

Table 8: **Effect of the Quota for Disabled Workers**

	Baseline	**No Quota**	**Δ**	**Full-Enforcement**	**Δ**
			Production and Firms		
GDP Per Capita	44.86	44.86	0.009%	44.55	-0.68%
Consumption	973.70	1273.31	0.014%	1263.56	-0.75%
Avg. Firm Size	44.97	44.98	0.015%	44.89	-0.18%
Hire Disabled Workers	2.96%	2.89%	-2.516%	6.94%	134.25%
τ	32.29%	32.29%	-0.013%	32.70%	1.28%
			Labor Market		
w_n	1382.10	1382.41	0.022%	1363.52	-1.34%
w_d	1187.20	1186.74	-0.039%	1217.05	2.51%
Disabled Labor Force	0.27	0.27	0.075%	0.30	9.33%
Non-Disabled Labor Force	0.74	0.74	0.079%	0.74	-0.47%

ence is not significant enough that firms would choose to adjust their size in order to avoid hiring disabled workers.

Table 8 demonstrates that the quota for disabled workers forces the government to raise payroll taxes. While the quota reduces the cost of disability insurance by inducing the labor force participation of disabled workers, it also reduces revenue from payroll taxes by decreasing firm size. The reduction in revenue from payroll taxes is greater than the savings from disability insurance, which leads the government to raise the marginal tax rate τ by 1.2%. Therefore, the quota for disabled workers does not reduce the overall cost of disability insurance.

Table 9: **Welfare Effect of Alternative Policies**

	No Quota	**Full-Enforcement**	**Optimal Subsidy**
Disabled	-0.006%	1.06%	2.50%
Non-Disabled	0.007%	-0.47%	0.06%
Economy	0.006%	-0.33%	0.29%

Table 9 presents the welfare effects of the quota for disabled workers in terms of consumption equivalent. The second column shows that disabled workers would be willing to give up to 1.06% of their consumption in the baseline economy to move to the economy with a quota for disabled workers. In contrast, non-disabled workers would be willing to pay 0.47% of their consumption to avoid the quota. Overall, the quota for disabled workers reduces welfare by 0.33%.

7.2 Effect of a Subsidy for Disabled Workers

In this subsection, I examine the impact of a subsidy for disabled workers. Figure 7 illustrates the welfare of both disabled and non-disabled workers at various tax rates on disabled workers. The graph indicates that non-disabled workers benefit from reduced taxes on disabled workers. This is because lowering the tax on disabled workers encourages their participation in the labor market, which lowers spending on disability insurance and consequently reduces the tax burden on non-disabled workers.

Table 10 shows that the optimal tax on disabled workers is a subsidy of 10.33%. There are two forces pushing for a lower tax on disabled workers: the dead-weight loss of taxing disabled workers and the disability insurance. Taxing disabled workers generates a higher dead-weight loss than taxing non-disabled workers because disabled workers have a higher labor supply elasticity, as discussed in section 6, and a higher labor demand elasticity due to the fixed cost of hiring them. Due to this force, a social planner would always prefer to impose higher taxes on non-disabled workers than on disabled workers. The second force inducing lower taxes on disabled workers is the disability insurance. By subsidizing disabled workers to join the labor force, the government can reduce the cost of disability insurance and lower the tax rate on non-disabled workers.

Table 10 shows that a 10% subsidy for disabled workers would increase GDP, consump-

Table 10: **Effect of Subsidy for Disabled Workers**

	Baseline	**Optimal Subsidy**	
		Taxes	
Tax on Disabled	32.29%	-10.33%	-131.99%
Tax on Non-Disabled	32.29%	33.27%	3.02%
		Production and Firms	
GDP	44.86	47.02831	4.61%
Consumption	973.70	1017.20	4.28%
Avg. Firm Size	44.97	47.5781	5.47%
Hire Disabled Workers	2.96%	5.75%	94.18%
		Labor Market	
w_n	1382.10	1378.484	-0.26%
w_d	1187.20	1041.571	-13.98%
Disabled Labor Force	0.27	0.77	64.35%
Non-Disabled Labor Force	0.74	0.74	-0.77%

tion, and firm size. This is because the subsidy reduces the cost of hiring disabled workers, which lowers the marginal cost of firms and stimulates production. Additionally, the subsidy has a sizable effect on the labor force participation of disabled workers, increasing it by 64%.

8 Conclusion

In this paper I use a model and data to evaluate the employment and welfare effects of a quota for disabled workers. I develop a model to study the labor market for disabled workers and the impact of a quota on firms. In this model, disabled and non-disabled workers must choose between participating in the labor force or staying outside of it. Disabled workers outside the labor force receive disability insurance. Firms produce by performing a range of tasks that can be carried out by either disabled or non-disabled workers, with disabled workers being relatively less productive at certain tasks.

The impact of the quota on the economy depends on two key parameters: the productivity and the labor supply elasticity of disabled workers. The productivity of disabled workers captures how costly it is for firms to hire them. The labor supply elasticity measures the extent to which disabled workers' wages must increase to induce them into joining the workforce.

Using variation from inspections of the quota for disabled workers, I show that the quota for disabled workers leads firms to reduce their size while increasing their hiring of disabled workers, suggesting that disabled workers have lower productivity. Moreover, I show that labor markets more exposed to the quota for disabled workers had a larger increase in the labor-force participation of disabled workers but higher unemployment of non-disabled workers.

Calibrating the model to match the empirical estimates, I show that a quota for disabled workers decreases welfare and employment. Because disabled workers have low productivity, the quota increases the marginal cost of firms and decreases production. Overall, I find large negative effects of the quota on firm size and on welfare.

Alternatively, I show that a subsidy for disabled workers can increase welfare and employment. By subsidizing disabled workers, the government can decrease expenditure on disability insurance and reduce overall taxation. Disabled workers would then select into employment in sectors where they are more productive.

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A Quota for Disabled Workers

A.1 Definition of Disabilities

Physical : "complete or partial alteration of one or more segments of the human body, resulting in impairment of physical function, presenting as paraplegia, paraparesis, monoplegia, monoparesia, tetraplegia, tetraparesia, triplegia, triparesia, hemiplegia, hemiparesis, ostomy, amputation or absence of limb, cerebral palsy, dwarfism, limbs with congenital or

acquired deformity, except for aesthetic deformities and those that do not produce difficulties in the performance of duties";

Auditive : partial or total bilateral loss of forty-one decibels (dB) or more, measured by audiogram at frequencies of 500HZ, 1,000HZ, 2,000Hz and 3,000Hz;

Visual : blindness, in which visual acuity is equal to or less than 0.05 at best eye, with the best optical correction; low vision, which means visual acuity between 0.3 and 0.05 in the best eye, with the best optical correction; cases in which the sum of the visual field measure in both eyes is equal to or less than 60o; or the simultaneous occurrence of any of the conditions above;

Cognitive : significantly lower than average intellectual functioning, with manifestation before the age of eighteen and limitations associated with two or more areas of adaptive skills, such as: communication, personal care, social abilities, health and security, academic faculties, leisure, work.

B Empirics

B.1 Effect of Disabled Quota on Firms

B.1.1 Random Inspection Time

B.1.2 Exogeneity

B.1.3 Other Empirical Results

Table 14: Effect of Inspection of the Quota for Disabled Workers on the Hiring of Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)
	N. Disabled Workers	$\mathbb{I}\{Physical\ Disability\}$	$\mathbb{I}\{Hearing\ Disability\}$	$\mathbb{I}\{Visual\ Disability\}$	$\mathbb{I}\{Cognitive\ Disability\}$	$\mathbb{I}\{Multiple\ Disabilities\}$
$\mathbb{I}\{Inspection\}$	6.868***	0.193***	0.113***	0.108***	0.113***	0.0328***
	(1.549)	(0.0160)	(0.0172)	(0.0182)	(0.0157)	(0.0114)
N	11336	11336	11336	11336	11336	11336
R^2	0.541	0.796	0.745	0.698	0.741	0.702
Mean Dep. Var	14.589	.475	.34	.253	.16	.075
Mean Ind. Var	.16	.16	.16	.16	.16	.16

Table 11: **Firm Characteristics and Year of Inspection**

	(1) log(year first inspec)	(2) log(year first inspec)	(3) log(year first inspec)
log(dis. quota)	-0.000338***	-0.000338***	-0.0000903***
	(0.000)	(0.000)	(0.000)
log(# workers)	0.000144***	0.000144***	0.0000182***
	(0.000)	(0.000)	(0.007)
log(avg. wage)	-0.000233***	-0.000233***	-0.0000131*
	(0.000)	(0.000)	(0.057)
log(yrs. educ.)	0.000456***	0.000456***	0.000274***
	(0.000)	(0.000)	(0.000)
shr. male	0.000233***	0.000233***	-0.0000115
	(0.000)	(0.000)	(0.413)
log(avg. hours)	0.000353***	0.000353***	0.000167***
	(0.000)	(0.000)	(0.000)
log(# establishments)	-0.0000564***	-0.0000564***	-0.0000167***
	(0.000)	(0.000)	(0.000)
log(# municipalities)	0.000130***	0.000130***	-0.00000953
	(0.000)	(0.000)	(0.457)
establishment growth	0.0000643***	0.0000643***	0.0000195***
	(0.000)	(0.000)	(0.000)
avg. wage growth	0.0000531*	0.0000531*	-0.0000817***
	(0.053)	(0.053)	(0.000)
employment growth	0.000000357	0.000000357	-3.51e-08
	(0.179)	(0.179)	(0.810)
N	91800	91800	68459
R^2	0.069	0.069	0.024

Table 15: Effect of Inspection of the Quota for Disabled Workers on the Hiring of Disabled Workers

	(1) *log(N. Physical Dis.)*	(2) *log(N. Hearing Dis.)*	(3) *log(N. Visual Dis.)*	(4) *log(N. Cognitive Dis.)*	(5) *log(N. Multiple Dis.)*
$\mathbb{I}\{Inspection\}$	0.180***	0.152*	0.00144	0.325**	0.349
	(0.0546)	(0.0811)	(0.0994)	(0.138)	(0.217)
N	5560	3975	2931	1889	824
R^2	0.839	0.842	0.751	0.860	0.853
Mean Dep. Var	1.85	1.401	.843	1.015	.573
Mean Ind. Var	.16	.16	.16	.16	.16

Table 12: **Firm Characteristics and Probability of First Inspection in the Future**

	(1) $\mathbb{I}\{$*first inspection t+1*$\}$	(2) $\mathbb{I}\{$*first inspection t+2*$\}$	(3) $\mathbb{I}\{$*first inspection t+3*$\}$	(4) $\mathbb{I}\{$*first inspection t+4*$\}$	(5) $\mathbb{I}\{$*first inspection t+5*$\}$
log(dis. quota)	0.0854*	0.0616	0.105	-0.195*	0.0242
	(0.057)	(0.315)	(0.202)	(0.077)	(0.869)
log(# workers)	-0.00317	0.00641	0.0188	0.0243	-0.0223
	(0.872)	(0.792)	(0.509)	(0.467)	(0.558)
log(avg. wage)	-0.0681	-0.00255	-0.0477	-0.313***	-0.207+
	(0.192)	(0.968)	(0.577)	(0.003)	(0.110)
log(yrs. educ.)	-0.101+	-0.113	-0.0931	0.0746	0.114
	(0.120)	(0.178)	(0.366)	(0.543)	(0.439)
shr. male	-0.140+	-0.0847	-0.323**	-0.0706	0.134
	(0.101)	(0.429)	(0.015)	(0.669)	(0.435)
log(avg. hours)	-0.121	-0.0479	0.0970	-0.200	0.0613
	(0.190)	(0.617)	(0.441)	(0.190)	(0.807)
log(# establishments)	-0.0686**	-0.0690*	-0.0107	-0.0122	0.200**
	(0.022)	(0.087)	(0.841)	(0.865)	(0.026)
log(# municipalities)	0.0223	0.331***	0.0931	0.0357	0.220
	(0.804)	(0.005)	(0.524)	(0.847)	(0.384)
establishment growth	0.00834	-0.00116	-0.0341+	0.0141	-0.149***
	(0.489)	(0.943)	(0.109)	(0.704)	(0.002)
avg. wage growth	0.0351	0.0305	0.0673	0.139**	0.0643
	(0.310)	(0.461)	(0.227)	(0.033)	(0.405)
employment growth	0.00171	0.00504	0.000757	-0.00440	-0.00209
	(0.579)	(0.199)	(0.867)	(0.406)	(0.713)
N	6406	4709	3829	3251	2515
R^2	0.767	0.766	0.762	0.787	0.816

Table 13: **Exogeneity Test**

	(1) $\mathbb{I}\{$*Ever Had Fed. Loan*$\}$	(2) $\mathbb{I}\{$*Fed. Loan*$\}$	(3) $\mathbb{I}\{$*Ever Had Public Procurement*$\}$	(4) $\mathbb{I}\{$*Public Procurement*$\}$	(5) *log(Public Procurement)*	(6) $\mathbb{I}\{$*Ever Campaign Contribution*$\}$	(7) $\mathbb{I}\{$*Ever Other Labor Infraction*$\}$	(8) $\mathbb{I}\{$*Other Labor Infraction*$\}$
$\mathbb{I}\{$*Inspection*$\}$	0.00194	-0.00458	-0.0129	-0.0109	0.458	0.000742	0.0106	-0.0485*
	(0.00494)	(0.00366)	(0.0109)	(0.00867)	(0.285)	(0.000912)	(0.0184)	(0.0276)
N	9918	9918	9918	9918	616	9918	8836	6537
R^2	0.867	0.395	0.876	0.623	0.869	0.952	0.798	0.428
Mean Dep. Var	.024	.008	.173	.084	12.745	.046	.653	.459
Mean Ind. Var	.18	.18	.18	.18	.18	.18	.18	.18

Table 16: Effect of Inspection of the Quota for Disabled Workers on the Characteristics of Disabled Workers

	(1) *log(Wage Disable)*	(2) *log(Hour Wage Disable)*	(3) *log(Yrs. Educ. Disable)*	(4) *log(Weekly Hour Disable)*	(5) *Physical Task*	(6) *Cognitive Task*	(7) *Abstract Routine*	(8) *Abstract Non-Routine*	(9) *Routine Manual*
$\mathbb{I}\{Inspection\}$	-0.0242	-0.0400*	-0.00239	0.000662	0.0474***	-0.0761***	0.0367**	-0.0747***	0.0444**
	(0.0211)	(0.0223)	(0.00850)	(0.00478)	(0.0183)	(0.0180)	(0.0185)	(0.0184)	(0.0185)
N	6377	6377	6374	6377	6361	6361	6361	6361	6361
R^2	0.887	0.897	0.854	0.759	0.872	0.811	0.879	0.797	0.877
Mean Dep. Var	7.542	3.86	2.29	3.711	.077	-.565	-.041	-.514	-.005
Mean Ind. Var	.16	.16	.16	.16	.16	.16	.16	.16	.16

Table 17: Effect of Inspection of the Quota for Disabled Workers on Firm Dynamics

	(1) *log(Wage Bill)*	(2) *log(Hourly Wage)*	(3) *log(Wage Bill of Newhires)*	(4) *log(Avg. Years Educ.)*	(5) *log(N. Establishments)*
$\mathbb{I}\{Inspection\}$	-0.0502***	-0.0223***	-0.0734**	-0.00608**	0.0139
	(0.0169)	(0.00773)	(0.0286)	(0.00262)	(0.0187)
N	9928	9928	9908	9928	9666
R^2	0.986	0.983	0.936	0.978	0.975
Mean Dep. Var	13.683	4.045	11.912	2.401	.967
Mean Ind. Var	.16	.16	.16	.16	.16

Table 18: Effect of Inspection of the Quota for Disabled Workers on Firm's Quota Requirement

	(1) *log(Disabled Quota)*	(2) $\mathbb{I}\{$*Decrease Group Quota*$\}$	(3) $\mathbb{I}\{$*Increase Group Quota*$\}$	(4) $\mathbb{I}\{$*Satisfy Past Quota*$\}$
$\mathbb{I}\{Inspection\}$	-0.0372*	0.0209***	-0.0175*	0.0631***
	(0.0211)	(0.00801)	(0.00894)	(0.0159)
N	9928	9928	9928	9928
R^2	0.981	0.514	0.555	0.793
Mean Dep. Var	2.509	.036	.086	.14
Mean Ind. Var	.16	.16	.16	.16

Table 19: Effect of Inspection of the Quota for Disabled Workers on Firms Close and Far to the Discontinuities

	(1) *log(N. Workers)*	(2) *log(Wage Bill)*	(3) *log(Earnings)*	(4) $\mathbb{I}\{$*Decrease Group Quota*$\}$	(5) $\mathbb{I}\{$*Satisfy Quota*$\}$
	Closer to Discontinuity				
$\mathbb{I}\{Inspection\}$	-0.0629*	-0.0896**	-0.0268*	0.0444**	0.282***
	(0.0371)	(0.0390)	(0.0160)	(0.0217)	(0.0452)
N	2309	2309	2309	2309	2309
	Far from Discontinuity				
$\mathbb{I}\{Inspection\}$	0.0267	0.0223	-0.00438	0.00153	0.0646**
	(0.0262)	(0.0283)	(0.0127)	(0.00971)	(0.0292)
N	2888	2888	2888	2888	2888

B.1.4 Robustness

Table 20: Effect of Inspection of the Quota for Disabled Workers on the Characteristics of Disabled Workers

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	log(N. Workers)	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*
$\mathbb{I}\{Inspection\}$	-0.0307**	-0.0419***	0.207***	-0.0302*	-0.0415**	0.203***	-0.0542**	-0.0583***	0.282***	-0.0225	-0.0266	0.328***
	(0.0140)	(0.0145)	(0.0562)	(0.0160)	(0.0165)	(0.0624)	(0.0218)	(0.0218)	(0.0766)	(0.0242)	(0.0242)	(0.0973)
Sector-Year FE							X	X	X	X	X	X
Munic-Year FE							X	X	X	X	X	X
Match-Year FE				X	X	X				X	X	X
N	11336	11336	6377	9928	9928	5202	7968	7968	4254	6072	6072	2928
R^2	0.974	0.968	0.850	0.981	0.979	0.868	0.987	0.985	0.949	0.993	0.992	0.970
Mean Dep. Var	5.985	5.972	2.406	5.985	5.972	2.406	5.985	5.972	2.406	5.985	5.972	2.406
Mean Ind. Var	.16	.16	.16	.16	.16	.16	.16	.16	.16	.16	.16	.16

Table 21: Effect of Inspection of the Quota for Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	log(N. Workers)	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*
$\mathbb{I}\{Inspection\}$	-0.0489***	-0.0567***	0.300***	-0.0307**	-0.0419***	0.207***	-0.0380	-0.0540*	0.351***
	(0.0116)	(0.0117)	(0.0394)	(0.0140)	(0.0145)	(0.0562)	(0.0320)	(0.0320)	(0.128)
N	32811	32794	15035	11336	11336	6377	2440	2440	1873
R^2	0.931	0.928	0.854	0.974	0.968	0.850	0.971	0.970	0.834
Mean Dep. Var	5.548	5.538	1.814	5.985	5.972	2.406	6.811	6.792	3.256
Mean Ind. Var	.15	.15	.15	.16	.16	.16	.18	.18	.18
N. Firms	4090	4090	2751	1417	1417	1059	305	305	265
Years Aft. Inspection	2	2	2	2	2	2	2	2	2
Matched Years	2	2	2	3	3	3	5	5	5

Table 22: Effect of Inspection of the Quota for Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	log(N. Workers)	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*
$\mathbb{I}\{Inspection\}$	-0.0307**	-0.0419***	0.207***	-0.0410***	-0.0550***	0.115	-0.0185	-0.0187	-0.317***
	(0.0140)	(0.0145)	(0.0562)	(0.0155)	(0.0163)	(0.0708)	(0.0243)	(0.0245)	(0.116)
N	11336	11336	6377	7974	7973	4303	2680	2680	1384
R^2	0.974	0.968	0.850	0.975	0.968	0.848	0.985	0.984	0.843
Mean Dep. Var	5.985	5.972	2.406	5.979	5.965	2.41	5.858	5.844	2.382
Mean Ind. Var	.16	.16	.16	.17	.17	.17	.19	.19	.19
N. Firms	1417	1417	1059	996	996	732	334	334	244
Years to Inspection	2	2	2	3	3	3	5	5	5
Matched Years	3	3	3	3	3	3	3	3	3

Table 23: Effect of Inspection of the Quota for Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)
	log(N. Disabled Workers)	$\mathbb{I}\{$*At Least One Disabled Worker*$\}$	$\mathbb{I}\{$*Satisfy Quota*$\}$	*log(N. Workers)*	*log(N. Not Disabled Workers)*	$\mathbb{I}\{$*Decrease Group Quota*$\}$
$\mathbb{I}\{Inspection\}$	0.241**	0.0893**	0.0909*	-0.0214	-0.0274	0.0121
	(0.116)	(0.0373)	(0.0473)	(0.0397)	(0.0396)	(0.0162)
N	938	1303	1303	1303	1301	1303
R^2	0.910	0.896	0.821	0.993	0.993	0.536
Mean Dep. Var	2.741	.761	.173	6.444	6.425	.019
Mean Ind. Var	.18	.18	.18	.18	.18	.18

Table 24: Effect of Inspection of the Quota for Disabled Workers

	(1)	(2)	(3)	(4)	(5)	(6)
	log(N. Disabled Workers)	$\mathbb{I}\{$*At Least One Disabled Worker*$\}$	$\mathbb{I}\{$*Satisfy Quota*$\}$	*log(N. Workers)*	*log(N. Not Disabled Workers)*	$\mathbb{I}\{$*Decrease Group Quota*$\}$
$\mathbb{I}\{Inspection\}$	0.241**	0.0893**	0.0909*	-0.0214	-0.0274	0.0121
	(0.116)	(0.0373)	(0.0473)	(0.0397)	(0.0396)	(0.0162)
N	938	1303	1303	1303	1301	1303
R^2	0.910	0.896	0.821	0.993	0.993	0.536
Mean Dep. Var	2.741	.761	.173	6.444	6.425	.019
Mean Ind. Var	.18	.18	.18	.18	.18	.18

Table 25: Effect of Inspection of the Quota for Disabled Workers by Strict Inspector

	(1)	(2)	(3)
	log(N. Workers)	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*
judgeinst_4	-0.241***	-0.273***	0.846***
	(0.0520)	(0.0526)	(0.239)
N	11336	11336	6377
R^2	0.974	0.968	0.850
Mean Dep. Var	5.985	5.972	2.406
Mean Ind. Var	.02	.02	.02

Table 26: Effect of Inspection of the Quota for Disabled Workers by High Fine Prob. Inspector

	(1)	(2)	(3)	(4)	(5)	(6)
	log(N. Workers)	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*	*log(N. Workers)*	*log(N. Not Disabled Workers)*	*log(N. Disabled Workers)*
$\mathbb{I}\{Inspection\}$	-0.0260	-0.0327*	0.341***	-0.0386*	-0.0445**	0.320***
	(0.0196)	(0.0196)	(0.0723)	(0.0207)	(0.0206)	(0.0713)
				7072	7071	3944
N	8376	8375	4463	0.965	0.965	0.902
R^2	0.971	0.970	0.890	5.968	5.955	2.309
Mean Dep. Var	5.954	5.942	2.352	.17	.17	.17
Mean Ind. Var	.17	.17	.17	884	884	668
N. Firms	1047	1047	770	2	2	2
Years to Inspection	2	2	2	3	3	3
Matched Years	3	3	3	3	3	3
Lag Year	2	2	2			

B.2 Effect on the Labor Market

B.2.1 Robustness

Table 27: Effect of Quota for Disabled Workers on the Labor Market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment Rate	Employment Rate	Employment Rate	Employment Rate	Employment Rate	Employment Rate	Employment Rate
	Disabled and Non-Disabled Workers						
exposure	-0.0201***	-0.0207***	-0.0185***	-0.0108***	-0.0272***	-0.00839**	-0.00754**
	(0.00384)	(0.00472)	(0.00488)	(0.00338)	(0.00492)	(0.00348)	(0.00370)
N	2211	2211	2211	1671	1667	1664	1664
R^2	0.961	0.961	0.961	0.971	0.964	0.981	0.984
# Regions	557	557	557	557	557	556	556
	Disabled Workers						
exposure	0.0442***	0.0488***	0.0553***	0.0290***	0.0291***	0.0244***	0.0221**
	(0.00659)	(0.00633)	(0.00697)	(0.00570)	(0.00783)	(0.00546)	(0.0105)
N	1615	1615	1615	1615	1603	1609	1597
R^2	0.865	0.866	0.867	0.879	0.869	0.891	0.898
# Regions	539	539	539	539	535	537	533
Controls	Baseline	Firm Size Distr.	Polynomial Firm Size Distr.	Occupation Shr.	Sectoral GDP	State-Year FE	All

Table 28: Effect of Quota for Disabled Workers on the Labor Market using Different Exposure Measures

	(1) Employment Rate	(2) Unemployment Rate	(3) Labor Force	(4) Shr. SSC Contrib.	(5) log(Income)
			Baseline		
exposure_quota	-0.0201***	-0.000432	0.00883***	-0.0128**	0.0283***
	(0.00384)	(0.00210)	(0.00263)	(0.00570)	(0.00604)
			Unique Region Firms		
exposure_quota	-0.0141***	-0.00501***	0.00608***	-0.0186***	0.0216***
	(0.00264)	(0.00169)	(0.00196)	(0.00407)	(0.00510)
			Demand for Disabled Workers		
exposure_quota	-0.0101***	0.000480	0.00503+	-0.0257***	0.0201***
	(0.00380)	(0.00199)	(0.00340)	(0.00372)	(0.00749)
			Disabled Normalized		
exposure_quota	-0.0120+	0.00284	0.00707*	-0.00662+	0.0101
	(0.00727)	(0.00428)	(0.00361)	(0.00455)	(0.0152)

Table 29: Effect of Quota for Disabled Workers on the Labor Market using Different Exposure Measures

	(1) Employment Rate	(2) Unemployment Rate	(3) Labor Force	(4) Work-Age Retirement	(5) Shr. SSC Contrib.	(6) log(Income)
			Baseline			
exposure_quota	0.0442***	0.0309***	-0.0369***	-0.0306***	0.113***	0.209***
	(0.00659)	(0.00338)	(0.00610)	(0.00341)	(0.0127)	(0.0228)
			Unique Region Firms			
exposure_quota	0.0277***	0.0167***	-0.0223***	-0.0202***	0.0667***	0.128***
	(0.00632)	(0.00342)	(0.00573)	(0.00359)	(0.0115)	(0.0233)
			Demand for Disabled Workers			
exposure_quota	0.0292***	0.0195***	-0.0220***	-0.0193***	0.0929***	0.182***
	(0.00713)	(0.00408)	(0.00630)	(0.00486)	(0.00960)	(0.0209)
			Disabled Normalized			
exposure_quota	0.0424***	0.0297***	-0.0356***	-0.0218**	0.119***	0.240***
	(0.00814)	(0.00668)	(0.00738)	(0.0108)	(0.0166)	(0.0304)

Table 30: Effect of Quota for Disabled Workers on the Labor Market of Disabled Workers using Different Definition of Disability

	(1) Employment Rate	(2) Unemployment Rate	(3) Labor Force	(4) Work-Age Retirement	(5) Shr. SSC Contrib.	(6) log(Income)	(7) log(N. Disabled)
exposure_quota	0.0454***	0.0310***	-0.0362***	-0.0306***	0.123***	0.198***	-0.00689
	(0.00644)	(0.00353)	(0.00595)	(0.00336)	(0.0129)	(0.0235)	(0.0228)
N	1516	1664	1516	1664	1575	1571	1667
R^2	0.888	0.796	0.895	0.825	0.838	0.986	0.976
# Regions	506	555	506	555	526	524	556

Figure 4: **Effect of Inspection on Different Sectors**

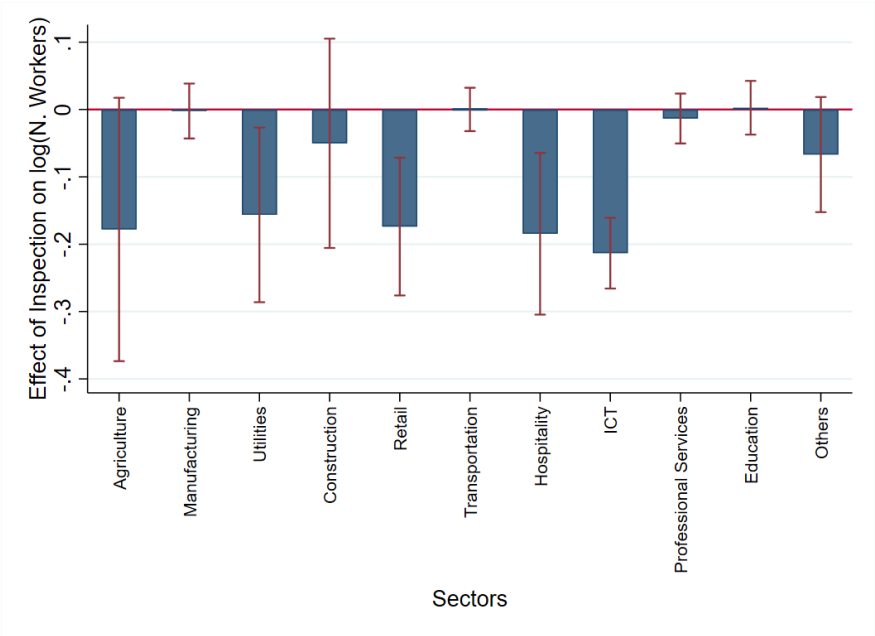


Figure 5: **Disabled Demand Across Regions in 2010**

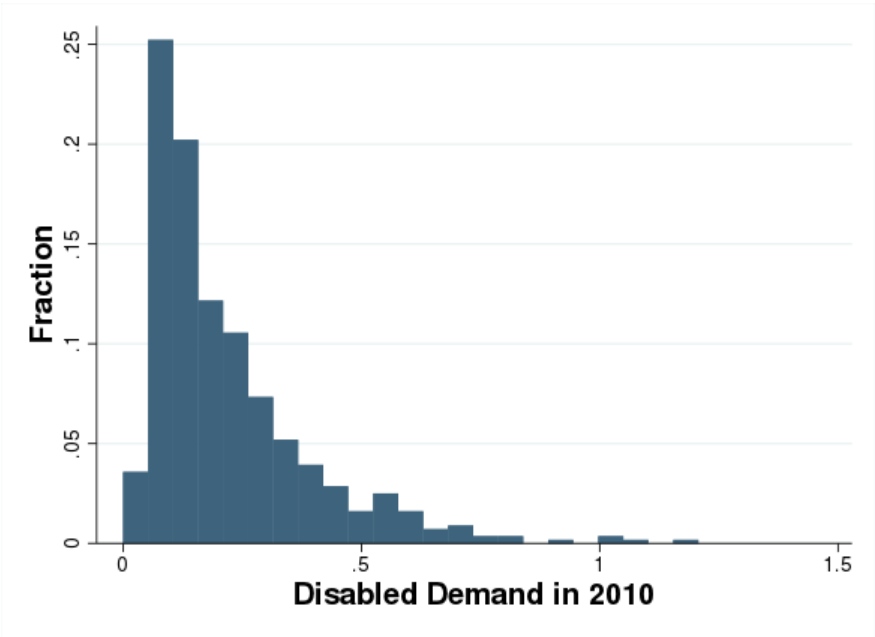
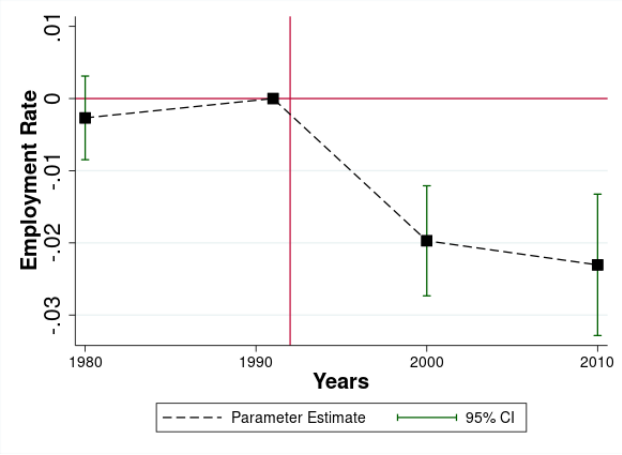
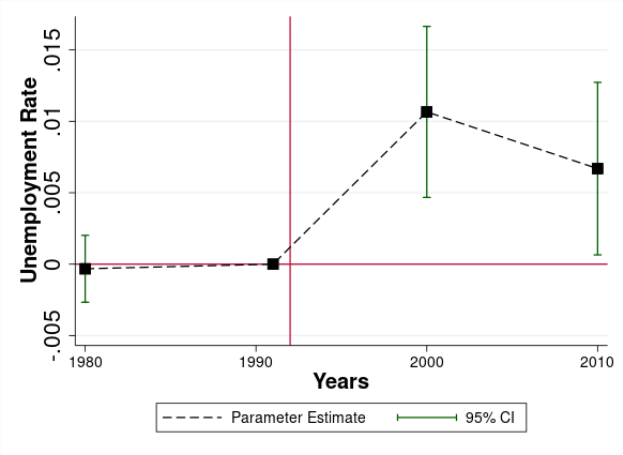


Figure 6: **Effect of Quota for Disabled Workers on the Labor Market**

(a) **Employment**



(b) **Unemployment**



(c) **Social Security Contribution**

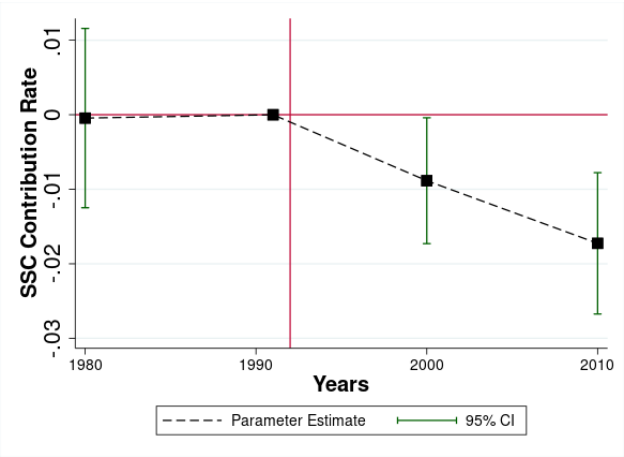
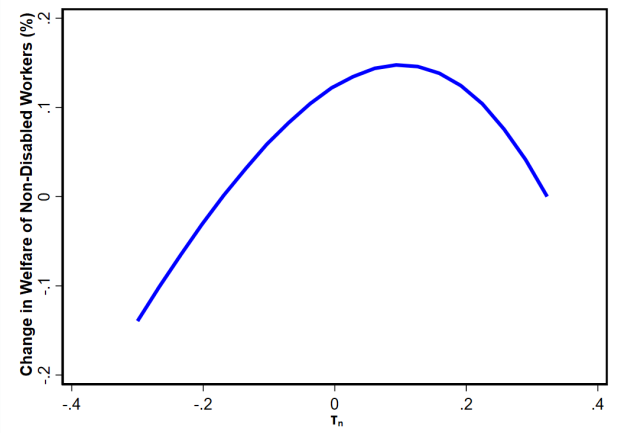


Figure 7: **Welfare Change of Subsidy for Disabled Workers**

(a) **Non-Disabled Workers**



(b) **Disabled Workers**

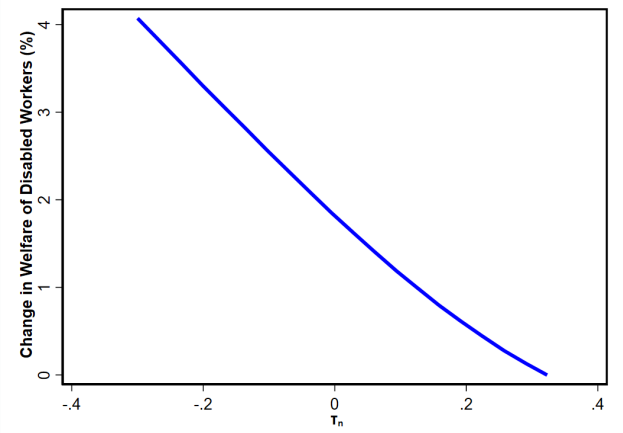
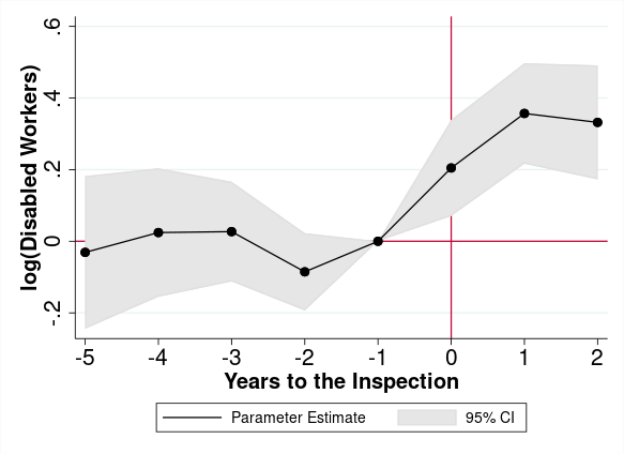


Figure 8: **Inspection and Hiring of Disabled Workers**

(a) **Number of Disabled Workers**



(b) **Number of Workers**