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Abstract

We conducted an experiment in quota-eligible firms to study if firms can be nudged to include individuals with disabilities (PwD) with different information letters. The intervention was conducted in the first year of implementing a quota law for PwD in Chile. Firms were randomly assigned to receive an informational email, benefits of inclusion email or information, and fines information. We use anonymized administrative data on monthly employer-employee linkages and disability certification records. We find that the pure information treatment increased the number of PwD working in the firms, and that most of this impact is explained by an increase in the reclassification of incumbent workers.

KEYWORDS: Employment Quota, Discrimination, People with Disabilities, Affirmative Action
JEL CODES: : J08, J15, J18, J20, J71, J78, H32, O15

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1 Introduction

The UN Convention on the Rights of People with Disabilities recognizes the social model of disability, which defines disability as the combination of impairments with external barriers that restrict participation in society (WHO 2011). People with disabilities (PwD) encounter numerous obstacles in regard to labor inclusion.

According to the OECD (OECD 2010) individuals with disabilities have a considerably lower employment rate of only 44%, in comparison to the 75% employment rate of those without disabilities. The lower participation is one of the pathways through which disability may lead to poverty (OECD 2010; WHO 2011). Additionally, PwD who are employed tend to receive lower wages compared to those without disabilities, although the extent of this wage gap varies across countries (WHO 2011). The exclusion of PwD from the labor market results in productivity loss and lower tax revenue (OECD 2010; WHO 2011). The losses can intensify when family members withdraw from employment or decrease their work hours to care for their disabled family members (WHO 2011). Although the detrimental effects of attitudinal and environmental barriers to labor inclusion for PwD are widely acknowledged, data limitations have made it challenging to accurately measure the costs of exclusion (WHO 2011).

Labor market outcomes for PwD are influenced by various factors, such as lower levels o educational human capital, leading to productivity differences (Gilleskie and Hoffman 2014; Jolly 2013; Jones et al. 2014; Schur, Kruse, and Blanck 2013); labor market imperfections, including discrimination and prejudice (Ameri et al. 2018; ILO 2015); and eligibility requirements for disability transfer programs creating disincentives (Acemoglu and Angrist 2001; French and Song 2014; Maestas, Mullen, and Strand 2013). Discrimination can manifest in different forms, including differential treatment (Schur, Kruse, and Blanck 2013), job insecurity, and prejudice by employers (Ameri et al. 2018). Imperfect information may also contribute to discrimination when employers assume that disability translates to reduced productivity. Correspondence studies have consistently found that individuals with disabilities have lower rates of call-back interviews when compared to candidates without disabilities (Jones et al. 2014). In Norway, a study was conducted to examine the impact of disclosing wheelchair use on job interview invitations. The study controlled for productivity differences related to disabilities by limiting job postings and applicants to roles where reduced mobility was not likely to affect job performance. The results revealed that disclosing the use of a wheelchair decreased the probability of receiving an interview invitation by 10.7 percentage points (Bjørnshagen and Ugreninov 2021).

One of the primary obstacles PwD face in the labor market is the challenge of gaining entry into it. PwD that want to participate in the labor market are already at a disadvantage in comparison to people without disabilities, as they have less access to education, environmental barriers that obstruct their access to the workplace, and less employment and vocational training opportunities (ILO 2015). To address these labor market imperfections and promote the employment of PwD, many countries have enacted laws prohibiting disability-based employment discrimination, as well as affirmative action policies, such as quotas.[1]

Although policies to include PwD have been introduced in many countries, there is limited empirical evidence of their income, particularly outside high-income countries. The small body of evidence has focused primarily on Austria, Spain, and Japan. Moreover, the available evidence suggests mixed results about the

[1]The quota policy has faced criticism because employers often opt to pay levies instead of achieving their quotas. It is important to note the costs associated with fees are not the primary consideration when hiring PwD. The expenses related to modification measures, workplace adaptations, or other arrangements may be by far more significant (Fuchs 2014).

effectiveness of quotas. [2].

Several studies have found evidence that employment quotas can increase the representation of PwD in firms. For example, a PwD quota was gradually introduced in Austria, requiring at least one position out of 25 to be filled by a PwD. Lalive, Wuellrich, and Zweimuller 2013 find that firms above the 25 people threshold hire approximately 12% more workers with disabilities than firms not subject to the quota. Threshold studies in Japan and Spain also found positive, but small, evidence of employment effects (Mori and Sakamoto 2018; Malo and Pagán 2014). However, these studies have found that the direct effects on the employment of PwD are weakened by firms reclassifying their own workers and poaching from other firms. In the Austrian study, as high as 64% of PwD workers were already employed by the firm when they received their disability status, suggesting that firms are complying with the quotas by relabeling workers rather than through new hires (Lalive, Wuellrich, and Zweimuller 2013). The analysis in Spain also found that employed people that face a disability are more likely to be employed continuously, while quota systems provide only small incentives to hire previously unemployed PwD (Malo and Pagán 2014). Therefore, quotas might increase job retention instead of attracting new entrants. Araújo et al. 2021 use an RD design to evaluate the enactment of PwD quotas in Brazil between 2007 and 2016. The authors don't find significant effects on average on the number of PwD workers. They do, however, find an increase in PwD workers in medium-sized firms (100 to 500 workers). Another paper in Brazil (Szerman 2022) focuses on the impacts of inspections of firms subject to the quota and finds mixed results. While the study finds positive effects of the inspections on the hiring of new employees with disabilities, negative effects were found on the growth of wages, retention, and promotion of existing employees with disabilities.

Regarding other outcomes, Mori and Sakamoto 2018 find mixed effects on productivity at the firm level in Japan. While the results of a fuzzy regression discontinuity design suggest that an increasing number of workers with disabilities does not necessarily decrease the firm's profit rate, results from the OLS regression indicate a negative relationship between the profit rate and PwD employment. Additionally, they find externalities for firms that were not required to comply with the law. Small-sized firms hired more PwD as their size increased, although they did not have to pay levies (the quota is implemented through a levy-grant scheme). This fact could suggest that the productivity of workers with disabilities is not low per se.

Other regression discontinuity studies have not analyzed the relationship between the promotion of quotas and firms' productivity. Some studies suggest that firms design jobs to comply with the quota that involves mostly low-qualified activities (Brennan and Conroy 2004; Eichhorst et al. 2010) that don't lead to productivity increases. Another group of evidence also points out that hiring PwD increases the overall productivity of the firm in developed countries (Lindsay et al. 2018), Brazil (Bitencourt and M Guimaraes 2012) and Turkey (Bengisu and Balta 2011). Some argue that when appropriate accommodations are provided to employees with disabilities, then overall productivity increases (Hartnett et al. 2011; Solovieva, Dowler, and Walls 2011). Event study cases in the US (e.g. Houtenville and Kalargyrou 2012) find a 20% increase in productivity and a 67% more return on investment after employing a significant number of PwD, however, these studies don't use a causal approach.

Another set of studies explores changes in the fines for non-compliance in the context of the quota thresholds. The study in Austria –found that the penalty increase improved compliance with the Law, with one in 40 firms employing one additional PwD (Wuellrich 2010). A similar approach in Hungary finds that the higher fine had a significant positive effect on the hiring of PwD, but with limited scope; 72% of firms subjected to the quota do not hire any PwD (Krekó and Telegdy 2022).

[2]However, the research in economics has focused on examining the effects of quota policies for protecting the interests of other marginalized groups, such as women (Pande 2003) and ethnic minorities (Mori and Sakamoto 2018).

As complying with quotas requires behavioral adjustments, and particularly in the Chilean case, firms can comply with the law without hiring PwD, it is relevant to understand how compliance can be affected. The tax literature has explored the effects of informational letters to taxpayers on tax compliance. Researchers have also studied the effects of letters conveying a deterrence message (for example, informing an increase in the probability of audits) and/or a tax moral message (social norms, intrinsic motivation, public services messages). Tax deterrence messages have in general positive impacts on tax compliance (Slemrod, Blumenthal, and Christian 2001; Kleven et al. 2011; Pomeranz 2015). For example, letters informing firms about additional tax monitoring increase tax payments in Chile (Pomeranz 2015). There is mixed evidence on the effects of social norms and public services messages, with positive impacts in the UK (Hallsworth et al. 2017) and Germany (Dwenger et al. 2016), and no impact in Argentina (Castro and Scartascini 2015). Bosch et al. 2021 study in Peru is closely related to this paper. Their study finds that sending letters that contained either a punitive or social commitment message encouraged compliance with a disability quota. They found neither type of message had an impact on compliance, but both increased the number of firms hiring at least one hour of workers with disabilities. The impact is driven by the punitive letter.

The remainder of the paper is organized as follows. Section 2 describes the Labor Inclusion Law. Section 3 lists our data sources and their arrangements; then it provides a set of descriptive statistics. Section 4 discusses the experiment design and empirical strategy. Section 5 presents our findings and Section 6 discusses our findings and proposes avenues for future research.

2 The Labor Inclusion Law

In 2017, the Labor Inclusion Law (21.015) was passed with the aim of facilitating the inclusion of People with Disabilities (PwD) into the workforce. From April 2018 onwards, the law has mandated that companies with 200 or more employees should maintain a minimum employment quota of 1% for PwD. In April 2019, this requirement was extended to companies with 100 or more employees. [3]

If the firm is unable to meet the 1% employment requirement for PwD, it is required to provide a justification on why the nature of its activities cannot be performed by PwD, the unavailability of suitable PwD candidates for the job offers, or document a lack of PwD interested in the firm's job offers. For the latter, the company needs to demonstrate that it had advertised the job openings on a public platform and had not received applicants with disabilities.

If the firm fails to fully or partially comply with the employment quota and is unable to justify the reasons mentioned earlier, it has two options to fulfil the requirement. The first is to make a donation, at the end of the year, equivalent to at least 24 minimum wages per employee who should have been hired to meet the quota, to organizations that work towards improving the quality of life of PwD. The second option is to subcontract firms that employ PwD, in order to meet the quota with the PwD workers that the subcontracting firm has. The contract between the company and the subcontracting firm should guarantee a minimum of 24 minimum wages for each PwD employee that the company was supposed to hire to fulfil the quota.

The process of accrediting an individual's disability status begins with a Health Commission (Comisión de Medicina Preventiva e Invalidez, COMPIN) evaluation, which is then registered in the National Disability

[3] It should be noted that the law also stipulates a preferential selection of PwD in the public sector and mandates a 1% employment quota for public institutions with 100 or more employees. However, there is no system in place to hold these institutions accountable for meeting these requirements.

Registry.[4] The Superintendency of Social Security maintains records of individuals who receive disability pensions. Since one can only receive a disability pension if they have accredited their disability through a Health Commission, these individuals do not need to accredit their condition again. [5]

Compliance with the quota through the employment of PwD is measured monthly, but the firms subject to the law are determined annually. At the end of each year, the number of employees on the last day of each month is divided by 12 (or the number of months the firm is active). If the average number of employees is 200 or more after April 2018 (or 100 or more after April 2019), then the required number of PwD to be hired is determined by applying a 1% quota to this average. Firms must comply with the law only for the months when the number of employees is above 100 (or 200). The targeted firms are required to register the number of employees and the number of PwD that should have been hired at the end of each year on the Labor Department's (Dirección del Trabajo, DT) web portal. DT, an adjunct office to the Ministry of Labor, is responsible for monitoring the law's compliance. The deadline for uploading contracts and registering compliance is April 1st of the following year (e.g., April 1st, 2019, for 2018). The effective number of PwD workers is determined by applying a floor function to 1% of the workforce (e.g., firms with 100 to 199 workers must hire 1 PwD, firms with 200 to 299 must hire 2 PwD, and so on).

Medium-sized companies that fail to comply with the quota may face penalties ranging from 2 to 40 monthly tax units (MTU), while large-sized companies may face penalties ranging from 3 to 60 MTU.[6] DT may apply discounts or increases depending on its Infractions Classifier.[7] However, according to anecdotal evidence, there has been little supervision in the first two years of implementation.[8]

Research on the connection between disabilities and the labor market in Chile has primarily explored the interaction between disabilities and social security provision, participation of PwD in the private pension funds system, and market efficiency mechanisms (James, Edwards, and Iglesias 2009; Reyes 2010; Joubert and Todd 2011). However, limited literature directly investigates the relationship between disabilities and labor markets in Chile, with most studies being descriptive. Over a decade ago, Contreras, De Mello, and Puentes 2011 used cross-section analysis to show that PwD have lower participation rates and receive lower returns to education. Melo and Valdes 2011 examine the socio-economic factors associated with disability in Chile and found a strong correlation between unemployment and the probability of living with a disability.

More recently, Martinez A. and Vial 2023 show that, even after controlling for education and gender, individuals with disabilities earn 21% less than those without disabilities. Meanwhile, Mayorga Camus 2018 examined the effects of the 2010 Law on Equal Opportunities and Social Inclusion of People with Disabilities (Law N. 20.422)[9]. The study did not identify any significant effects on PwD's labor market outcomes by analyzing longitudinal data from the Chilean Social Protection Survey.

[4] To prove their disability status, individuals must provide reports that show their disability. A multidisciplinary disability commission evaluates the individual's situation, considering their functioning, biomedical, social, and individual network. It determines the origin, level, and degree of the disability and may request a re-evaluation if necessary. An individual is certified as having a disability if their disability is 5 percent or more. The Commission then informs the National Registry about the disability status.

[5] If they secure employment, the worker can keep the disability pension as long as they earn below certain thresholds.

[6] According to the Internal Tax Service (SII in Spanish), as of October 2019, a MTU was equivalent to approximately US$68.2. Therefore, the fine would range from approximately US$136.4 to US$2,728 for medium-sized companies and from approximately US$136.4 to US$4,092 for large-sized companies.

[7] Page 82 of this link shows the current infraction ranges for non-compliance with the labor inclusion law.

[8] During late 2019, there was social unrest in Chile, and the Covid-19 pandemic led to large lockdowns starting in March 2020. This challenging context should be taken into consideration when evaluating the results of this evaluation.

[9] This legislation aims to increase the labor inclusion of PwD by promoting several measures, including improving the accessibility and job accommodations, as well as eliminating custom tariffs for relevant equipment.

3 Data

3.1 Sources

This paper uses four primary sources of data, including an employer-employee panel obtained from the unemployment insurance (AFC), two registries on disability certifications (RND and IPS), and a list of firm-level reports on compliance with the labor inclusion law (Alternative Compliance) from the Labor Direction. A comprehensive description of these data sources is available in Appendix B.

- **AFC** The unemployment insurance data (henceforth AFC, *Asociación del Fondo de Cesantía*) is a monthly employer-employee database that includes all worker-employer relationships, along with contractual status (temporary or permanent) and top-coded wages. At the employer level, the dataset also includes the firm's industry and its headquarters location.[10] AFC, the unemployment insurance database used in this study, does not include data on public sector firms or their employees.
- **RND** The official registry for certified disabilities in Chile is the National Disability Registry (RND, *Registro Nacional de Discapacidad*), which maintains a record of individuals with disabilities. Many social programs for people with disabilities rely on this registry as a prerequisite for eligibility.
- **IPS** The social security institute (henceforth IPS, *Instituto de Previsión Social*) also records disability status as it processes disability pensions.
- **Alternative Compliance Data** on other methods of compliance, such as donations to PwD advocacy groups, outsourcing services from compliant firms, and informing the enforcing agency of reasons for non-compliance, such as unsuitable job postings, are also included in our study. The Labor Direction of the Labor Ministry (DT, *Dirección del Trabajo*) provides this data.

We generated a set of yearly firm-level outcomes by combining employer-employee labor trajectories and person-level disability status. To achieve this, we compiled a monthly panel of matched employer-employee data and aggregated it at the firm-month level. Finally, we calculated yearly outcomes by averaging monthly firm-level data. The panel covers the period from May 2015 to August 2020, since the RND and the IPS, our sources of PwD identification, are available simultaneously during these periods. Data on alternative compliance mechanisms are available from 2018 to 2020, after the quotas phase-in.

3.2 Variables of Analysis

PwD Labor Inclusion Outcomes: These are annual firm-level outcomes that reflect PwD labor inclusion, either by directly employing PwD, or through alternative compliance with the labor inclusion law.

- *PwD Share:* Computed as a yearly average of the monthly share of employees with a certified disability with respect to the total number of employees. This is our main outcome and the primary means through which firms can comply with the labor inclusion law.

[10] Industry as per the Internal Revenue Services (SII) industry classification system, that corresponds almost identically to ISIC Rev 4. The location is registered as the headquarters municipality, Chile's smallest administrative division. This creates a bias in terms of the number of workers towards larger municipalities, especially those located in Santiago, where multiplant firm's headquarters tend to concentrate.

- *Number of PwD:* Computed as the yearly average of the monthly number of employees with a certified disability at the firm level.
- *1=Firm with PwD:* Binary variable that takes a value of one if the number of employees with a certified disability is strictly greater than zero.
- *1=Complies with Quota:* Binary variable that takes a value of one if the PwD share is at least 0.01, which is the minimum threshold set by the law. Note that there are additional compliance mechanisms besides directly hiring employees with a disability.

Labor Dynamics: These are firm-level indicators that drive the labor dynamics among working PwD.

- *Reclassified employees* are workers who obtained a disability certification status during their current job spell.[11] At the firm level, we calculate this outcome as the aggregate number of reclassified PwD (zero if no employees with a disability), and as the share of PwD reclassified over the total number of PwD in the firm (missing if no employees with a disability).[12]
- *Hirings:* Hired employees are workers whose disability status was already certified before their current job spell. Like with reclassifications, we calculate this outcome at the firm level both as the aggregate number of hired PwD (zero if no employees with a disability), and as the share of PwD hired (missing if no employees with a disability).

4 Experiment Design

Design

We conducted an experiment to investigate the effectiveness of using behavioral insights to increase compliance with the quotas.[13] In collaboration with the Labor Department (Dirección del Trabajo, DT), we designed three different types of letters with the goal of increasing compliance. The study aims to determine whether the information is sufficient to change compliance behavior, or if a positively framed letter emphasizing the benefits of compliance has a larger impact on PwD labor outcomes than a message that emphasizes the penalties for non-compliance.

Emails were sent on May 28, 2019, between 13:10 and 13:20 hours through an institutionalized email server of the Labor Department. This is the second year of implementation of the quota for firms with more than 200 employees, and the first year for firms with over 100. We chose email as the medium for delivery because it allows for tracking its reception. Research in the tax literature has suggested that emails can be more effective than letters in delivering the same message in certain contexts (Mascagni, Nell, and Monkam 2017). To increase the saliency of the emails, the letters were sent through an institutionalized mail server of the Direction of Labor and signed by its Director, following standard practice in the tax literature.

Quota-eligible firms were randomly assigned to four treatment arms:

[11] This variable takes a value of 1 if the worker did not have a disability certification or pension before, and 0 if it had it before or does not have it in any period

[12] A certified disability status can be obtained either by registering at RND, or by receiving a disability pension from IPS. See Section 3 and Appendix B for more details.

[13] AEA RCT Registry (RCT ID AEARCTR-0004813). IRB Approval Number 190123003 from The research design was submitted to the Social Science Pontificia Universidad Católica de Chile Institutional Review Board (IRB).

- Pure Control
- Informational
- Benefits: Information plus benefits of inclusion (positive social norms)
- Fines Information plus threat of fine (deterrence)

The letter that emphasizes benefits is consistent with social norms in the tax literature, which inform about the advantages of including PwD in the workforce. On the other hand, the letter that emphasizes penalties aligns with the deterrence approach in the tax literature.

Table 1 shows the treatment assignment.

Table 1: Treatment Assignment

Group	N
Control	1973
Informative & letter	1970
Deterrence & letter	1969
Letter & benefits	1966
Total	7878

Source: Author's calculation.

We obtained public firm-level data from the National Tax Authority to create our sample. The sample includes all firms that meet the following criteria: i) have a commercial legal personality, ii) employ 100 or more workers (self-reported), and iii) have an active email address. There are 7,878 firms that meet these criteria.

The randomization was stratified by the number of employees (100-149, 150-199, 200-499, 500 or more), the principal economic activity of the firm (agriculture, livestock, forestry, fishing, manufacturing, construction, and services), and geographic location (i.e. north, center, Metropolitan Region and south). It is important to note that we did not have access to the disability status of the employees when conducting the randomization. Table 2 shows the number of firms by strata.

Table 2: Number of Firms by Strata

Economic activity	Geographic region + number of workers																Total
	North				Center				Metropolitan area of Santiago				South				
	100-149	150-199	200-499	500+	100-149	150-199	200-499	500+	100-149	150-199	200-499	500+	100-149	150-199	200-499	500+	
Agriculture, livestock, forestry & fishing	21	9	27	4	191	110	227	105	84	63	124	68	38	21	38	34	1164
Industry	34	25	37	22	108	54	88	52	235	134	277	173	25	13	28	8	1313
Construction	71	32	62	20	173	83	155	64	257	130	308	197	20	12	25	12	1621
Services	120	57	62	17	344	141	185	102	844	426	755	529	86	40	56	16	3780
Total	246	123	188	63	816	388	655	323	1420	753	1464	967	169	86	147	70	7878

Source: Author's calculation.

Table 3 shows that firms were balanced in observables across a broad set of variables such as sales.

Table 3: SII Experimental Sample Balance Tests

	Control	Informative letter	Punitive letter	Letter+benefits	Overall	p-value joint test of treatment arms
A. Size using annual sales						
Micro firm (10UF - 2400 UF)	0.007	0.007	0.008	0.010	0.008	0.549
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	
Small firm (2400 UF - 25000 UF)	0.130	0.132	0.138	0.127	0.132	0.721
	(0.020)	(0.022)	(0.021)	(0.021)	(0.020)	
Medium firm (25000 UF - 100000 UF)	0.319	0.295	0.306	0.307	0.307	0.327
	(0.026)	(0.024)	(0.024)	(0.029)	(0.024)	
Big firm (100000 UF+)	0.533	0.554	0.536	0.543	0.542	0.196
	(0.042)	(0.043)	(0.045)	(0.047)	(0.043)	
B. Tax regime						
R 14 A	0.259	0.265	0.244	0.257	0.256	0.441
	(0.024)	(0.026)	(0.023)	(0.027)	(0.024)	
R 14 B	0.711	0.709	0.727	0.717	0.716	0.547
	(0.027)	(0.028)	(0.026)	(0.030)	(0.027)	
R 14 ter	0.030	0.025	0.029	0.026	0.028	0.788
	(0.006)	(0.004)	(0.005)	(0.006)	(0.004)	

Note: Author's calculation based on SII data.

Merge with Outcome Data

After obtaining access to unemployment insurance and disability records data, we merged the experimental data with these administrative records. Table 4 presents descriptive statistics on the firms included in the experiment design.[14] Firms included in the experiment are significantly larger than the average firm, with an average workforce size of over 200 workers, compared to less than 10 workers for firms not included in the experiment. The experiment covers more than 1.5 million workers, whereas 3.5 million workers are not included in the experiment. Although the proportion of workers with disabilities in the experimental sample is slightly higher than the total number of workers, this share increases over time. Therefore, the resulting dataset used in the study is not representative of all firms subject to the law, and the external validity of the results should be considered in this context.

[14]We exclude non-matched firms (included in the randomization procedure but not available in the AFC dataset) since the non-matching rate is negligible and comprises only two firms.

Table 4: Experimental Sample

Year	2015	2016	2017	2018	2019	2020
A. Number of Firms						
AFC matched firms	7.32	7.68	7.87	7.72	7.32	6.92
AFC non-matched firms	368.69	412.71	417.56	436.29	445.21	394.23
B. Average Firm Size						
AFC matched firms	216.10	218.51	223.50	229.82	237.88	237.88
AFC non-matched firms	8.93	8.30	8.26	8.43	8.57	9.10
C. Number of Workers						
AFC matched firms	1582.31	1678.83	1760.28	1775.89	1742.29	1644.19
AFC non-matched firms	3293.83	3427.06	3449.88	3680.81	3817.87	3588.34
D. Number of PwD						
AFC matched firms	5.40	6.18	6.84	8.15	10.67	11.63
AFC non-matched firms	12.68	14.12	14.91	17.38	21.23	22.23

Note: Each panel contains information on firms included in the experimental sample (AFC matched firms) and firms not included in the experimental sample (AFC non-matched firms). All values are in thousands. Panel **A.** shows the number of firms, panel **B.** shows average firm sizes (number of workers), panel **C.** shows the total number of workers, panel **D.** shows the number of PwD.

Balance and Descriptive Statistics

As previously mentioned, the random assignment resulted in balanced treatment groups when we use tax data. However, upon assessing balance in observables from AFC data, as shown in Table 5, we observe statistically significant differences between treatment groups prior to the letters being sent. For example, the groups that received an email had a higher share of PwD than the control group, with differences significant at the 1-10% level depending on the comparison.

Table 5: AFC Experimental Sample Balance Tests

Outcome	Number of Workers			Wage Bill		
Treatment Arm	Information	Benefits	Fines	Information	Benefits	Fines
Control	-25.08***	-8.04**	-18.42***	-22.58***	-3.66	-5.24
Information	-	17.04***	6.67	-	18.91***	17.33***
Benefits	-	-	-10.38**	-	-	-1.58
Outcome	Number of PwD			PwD Share		
Treatment Arm	Information	Benefits	Fines	Information	Benefits	Fines
Control	0.018830	0.023002	-0.006672	0.000264***	0.000145*	0.000124*
Information	-	0.004173	-0.025502	-	-0.000119*	-0.000140*
Benefits	-	-	-0.029674*	-	-	-0.000021

Note: The tables show the differences of the means of outcomes between treatment groups in rows and columns, along with the statistical significance of the difference, given by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The outcomes are all at the firm level and include the number of workers, the total wage bill (in millions of pesos of 2017), the PwD share, and the number of PwD. Panel **I.** uses the year 2017, before the experiment and the quotas phase-in. Panel **II.** uses the year 2019, after the experiment and the quotas phase-in.

Table 6 shows sample sizes and descriptive statistics for the experimental sample, the control group, pooled treatments, and by treatment arm. The statistics are compiled for 2018 (before the experiment).

Table 6: Experiment Descriptive Statistics

Sample	Experimental Sample		Treated		Control		Information		Benefits		Fines	
Year	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
A. Main Outcomes												
Number of firms	7727	7324	5794	5484	1933	1840	1940	1835	1930	1831	1924	1818
PwD share	0.004299	0.005246	0.004226	0.005180	0.004520	0.005442	0.004227	0.005361	0.004224	0.004991	0.004226	0.005188
Number of PwD	1.055932	1.457136	1.048617	1.470899	1.077859	1.416117	1.050152	1.497810	1.033966	1.447114	1.061766	1.467693
1 = Firm with PwD	0.579526	0.609366	0.574905	0.603392	0.593378	0.627174	0.573196	0.589646	0.566321	0.597488	0.585239	0.623212
1 = Complies with quota	0.134334	0.164528	0.130998	0.160832	0.144335	0.175543	0.134536	0.164578	0.130570	0.158930	0.127859	0.158966
Average FTE PwD	0.936191	0.939089	0.936596	0.940188	0.935015	0.935938	0.930787	0.938528	0.939200	0.940822	0.939805	0.941162
Number of FTE PwD	0.997958	1.374047	0.988067	1.383340	1.027603	1.346347	0.978713	1.385230	0.982938	1.382305	1.002645	1.382476
B. PwD Wages												
PwD wage bill	0.571179	0.890047	0.568853	0.893338	0.578151	0.880239	0.610721	0.954402	0.536822	0.876814	0.558769	0.848345
PwD average wage	0.497487	0.543049	0.498997	0.544950	0.493101	0.537597	0.513495	0.553193	0.495106	0.538761	0.488455	0.543055
PwD wage bill share	0.003600	0.004290	0.003559	0.004245	0.003722	0.004423	0.003513	0.004382	0.003435	0.004019	0.003730	0.004334
PwD wage premia	-0.196119	-0.203116	-0.196561	-0.205486	-0.194838	-0.196320	-0.190880	-0.207102	-0.197221	-0.207556	-0.201530	-0.201944
C. PwD Contract												
Number of PwD under indefinite contract	0.657359	0.980884	0.650577	0.988580	0.677687	0.957947	0.673607	1.062413	0.639373	0.948824	0.638596	0.954098
Share of PwD under indefinite contract	0.478593	0.530491	0.475546	0.529276	0.487442	0.533975	0.467965	0.529449	0.487238	0.521773	0.471683	0.536356
PwD contract premia	-0.117873	-0.103596	-0.119106	-0.106412	-0.114292	-0.095521	-0.125767	-0.105814	-0.110253	-0.112935	-0.121123	-0.100684
D. PwD Labor Dynamics												
Reclassification share	0.127802	0.191936	0.126872	0.196076	0.130504	0.180065	0.135620	0.206485	0.121996	0.196759	0.122965	0.185475
Number of reclassifications	0.159887	0.387343	0.162002	0.402463	0.153548	0.342278	0.179553	0.448818	0.147101	0.418018	0.159252	0.340007
Hiring share	0.876650	0.812967	0.878074	0.809656	0.872513	0.822459	0.869191	0.800290	0.884420	0.808597	0.880687	0.819624
Number of hirings	0.905113	1.080654	0.896381	1.080418	0.931287	1.081357	0.878588	1.058620	0.900552	1.044683	0.910137	1.138412
Tenure	13.609601	18.252590	13.484125	18.103134	13.973996	18.681141	13.627888	18.445072	13.491839	18.142973	13.334662	17.738121
PwD Tenure Premia	-4.042263	-4.451598	-4.091088	-4.624260	-3.900468	-3.956504	-4.060960	-4.480911	-4.104491	-4.497647	-4.107832	-4.883411
E. PwD Heterogeneity												
Share physical	0.002240	0.002820	0.002167	0.002792	0.002462	0.002903	0.002154	0.002933	0.002175	0.002649	0.002171	0.002794
Share mental	0.001058	0.001224	0.001061	0.001211	0.001049	0.001264	0.001086	0.001161	0.001086	0.001229	0.001011	0.001242
Share sensorial	0.001003	0.001233	0.001000	0.001209	0.001013	0.001305	0.000962	0.001207	0.000987	0.001197	0.001052	0.001222
Share multiple	0.000375	0.000359	0.000369	0.000339	0.000394	0.000419	0.000376	0.000358	0.000365	0.000337	0.000365	0.000322
Number of physical	0.552630	0.772043	0.548756	0.781337	0.564240	0.744341	0.561059	0.808331	0.518174	0.750077	0.567028	0.785575
Number of mental	0.279474	0.352576	0.277469	0.357685	0.285483	0.337348	0.275418	0.352373	0.293064	0.356438	0.263893	0.364302
Number of sensorial	0.240262	0.355606	0.241908	0.360835	0.235329	0.340020	0.233876	0.359193	0.246619	0.379120	0.245282	0.344077
Number of multiple	0.090063	0.092434	0.089750	0.091116	0.091002	0.096363	0.084264	0.086607	0.093905	0.091219	0.091115	0.095561
F. Compliance												
1 = Complies with law	0.288469	0.306663	0.284777	0.306163	0.299534	0.308152	0.281443	0.306267	0.278756	0.303659	0.294179	0.308581
1 = Alternative compliance with law	0.034036	0.035363	0.036762	0.036834	0.025867	0.030978	0.039691	0.040327	0.033679	0.034954	0.036902	0.035204
G. Firm Productivity												
Months active	11.633752	11.633261	11.624957	11.629285	11.660114	11.645108	11.609279	11.649046	11.655958	11.596395	11.609668	11.642465
Number of workers	229.829424	237.888595	233.942416	243.280180	217.501089	221.819328	241.619535	250.359658	224.211087	234.433166	235.963131	245.044779
Average wage	0.736349	0.765697	0.734898	0.764950	0.740697	0.767925	0.734602	0.764976	0.736204	0.763318	0.733886	0.766566
Wage bill	193.777782	208.047787	196.806029	212.801655	184.700871	193.879196	208.939633	224.581032	189.742813	205.017508	191.656765	208.751938
Share of workers under indefinite contract	0.624666	0.657503	0.623190	0.657711	0.629092	0.656882	0.619722	0.656410	0.628028	0.659874	0.621833	0.656846
Number of workers under indefinite contract	158.275490	167.929674	161.122438	171.767426	149.742009	156.491508	171.393716	182.555352	151.361562	161.950917	160.557059	170.765325
Average FTE	0.953125	0.953152	0.952667	0.952988	0.954499	0.953641	0.951974	0.953169	0.953729	0.952652	0.952299	0.953143
Number of FTE Workers	218.078459	225.784058	221.208331	230.216681	208.696941	212.572915	225.835996	233.844166	214.788686	224.851165	222.981847	231.959160

Note: Panels **A.** to **G.** show firm-level outcomes. Column (1) and (2) shows outcomes for the experimental sample. Columns (3) and (4) show outcomes for treated firms. Columns (5) and (6) show outcomes for the control group. Columns (7) to (12) show outcomes by treatment arm.

Estimated Equation

In order to control for pre-treatment differences between treatment arms, we estimate a difference in difference regression as follows:

$$\begin{aligned} Y_{i,t} = {} & \alpha_0 \text{ Benefits}_i + \beta_0 \text{ Fines}_i + \gamma_0 \text{ Information}_i \\ & + \alpha_1 \text{ Benefits}_i \times \text{Post}_t + \beta_1 \text{ Fines}_i \times \text{Post}_t \\ & + \gamma_1 \text{Information}_i \times \text{Post}_t + \phi \text{Post}_t + X'_{i,t}\Phi + \epsilon_{i,t} \end{aligned} \tag{1}$$

The variables Information_i, Benefits_i and Fines_i are dummies that take a value of 1 if the firm was sent an informational letter with a pure informational, positive or punitive content, respectively. The variable Post_t takes a value of 1 after DT sent the informational letters (2019 onwards). The interaction terms (treatment dummies interacted with Post_t) capture the effect of the informational contents of the letters after the letters

were sent. The vector $X'_{i,t}$ controls for firm characteristics and includes industry (4 digit ISIC Rev 4) and location fixed effects.

5 Results

The impact of the experiment on the outcomes of interest is presented in Table 7. The treatment effects are estimated using the difference-in-differences approach specified in Equation 1. The first column presents the results pooling all three treatment arms (information, benefits, and fines), while the following columns show results by treatment arm (information, benefits, and fines) separately. In columns (5) and (6), the control group is omitted from the estimation sample, and the pure informational treatment is used as the control group.

Table 7: Experiment Impact

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Pooled Treatment	Treatment Arm			Information as Control	
Treatment	Treated	Information	Benefits	Fines	Benefits	Fines
A. PwD Labor Inclusion Outcomes						
PwD share	0.000144	0.000449	-0.000233	0.000217	-0.000624	-0.000133
Number of PwD	0.142082***	0.20819**	0.121232	0.101912	-0.07594	-0.106573
1 = Firm with PwD	-0.020548	-0.024626	-0.020814	-0.016267	0.005698	0.012385
1 = Complies with law	0.012705	0.016695	0.002662	0.018721	-0.014062	0.001168
B. PwD Labor Dynamics						
Number of reclassifications	0.107250***	0.153239**	0.137390	0.032084	-0.012238	-0.126048
Number of hirings	0.036088	0.051486	-0.015185	0-071705	-0.064064	0.020270
Reclassifications share	0.015072	0.017987	0.018864	0.008913	0.002643	-0.011529
Hirings share	-0.016057	-0.018416	-0.0205586	-0.009722	-0.004379	0.010882

Note: Note: The table displays the interaction between treatment status and the post-experiment dummy, as in Equation 1. Column (1) shows pooled treatment impact. Columns (2) to (4) show impacts by treatment arm. Columns (5) and (6) show impacts by treatment arm using the informational treatment as control and omitting the control group. The statistical significance of the coefficients is given by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In Column(1) of Table 7, we see that the pooled treatment has a positive impact on the number of workers with disabilities. The coefficient on the interaction between treatment and post-experiment dummy suggests that receiving a treatment email increases the number of PwD in the firm by 0.14, which is statistically significant at the 1% level. This result indicates that the emails were effective in promoting the inclusion of PwD in firms.

To further analyze this effect, we decompose it into the number of reclassifications and new hires. The result shows that 0.10 of the total effect is due to the number of reclassifications, which is significant at the 5% level. The coefficient for the number of new hires is 0.03 and non-significant. This suggests that the increase in the number of PwD can be attributed to an increase in the reclassification of incumbent workers, rather than new hires.

These findings provide insights into the mechanism through which the treatment effect occurs. Specifically, the results suggest that the emails prompted firms to reclassify their existing employees as PwD, more than hiring new employees with disabilities. This could be due to the fact that firms may find it easier to

accommodate existing employees with disabilities than to recruit and train new employees with disabilities.

The results in columns (2) to (4) allow us to understand the impact of each type of letter. Only the informational letter has a positive and significant impact, both in the number of PwD in the firm, increasing by 0.20, and in the number of reclassifications. The benefit and fines letters do not have an impact on any outcome.

Columns (2) to (4) of Table 7 provide further insights into the impact of each type of letter on the outcomes of interest. The results show that only the informational letter has a positive and statistically significant impact on the number of workers with disabilities in the firm. Specifically, the coefficient on the interaction between the informational treatment and the post-experiment dummy is 0.20, significant at the 1% level. This indicates that receiving the informational letter increases the number of PwD in the firm by 0.20 on average, compared to firms that did not receive any treatment.

In terms of the mechanisms behind this effect, the impact is driven by an increase in the number of reclassifications, rather than new hires. The coefficient on the interaction between the informational treatment and the post-experiment dummy is 0.15 for the number of reclassifications, which is significant at the 5% level. However, the coefficient for the number of new hires is only 0.05 and is not statistically significant. Therefore, the increase in the number of workers with disabilities induced by the informational letter is primarily due to an increase in the reclassification of incumbent workers.

On the other hand, the benefit and fines letters do not have any impact on any of the outcomes of interest. The coefficients for these treatments are not statistically significant, indicating that firms that received these letters did not exhibit any significant changes in the number of workers with disabilities or their employment status. Overall, these results suggest that only the informational letter was effective in promoting the inclusion of workers with disabilities in the workplace, primarily by increasing the reclassification of incumbent workers.

Finally, columns (5) and (6) allow us to compare the effects of the benefit and fines letters with respect to the informational letter. We observe no statistically significant differences between them.

Columns (5) and (6) of Table 7 present the results of a comparison between the benefits and fines treatments with the pure informational treatment as the control group. Specifically, column (5) shows the impact of the benefits letter, while column (6) shows the impact of the fines letter. The coefficients for both treatments are not statistically significant, indicating that neither of them had a significant impact on any of the outcomes. This suggests that the informational treatment was the key driver of the overall treatment effect and that the benefits and fines treatments did not add any additional impact beyond the information provided in the informational treatment.

We conclude that providing information to firms has a positive effect on the number of employees with disabilities at the firm level. This increase in the number of workers with disabilities is primarily due to reclassifications. However, we find that this effect is only significant within the informational treatment, and not for the benefits and fines treatments.

6 Discussion

Our study aims to investigate the effectiveness of using behavioral insights to increase compliance with PwD quotas. We conducted an experiment in collaboration with the Labor Department (Dirección del Trabajo).

Our study aimed to determine the most effective type of letter in promoting compliance behavior. We designed three letters with varying frames and content to achieve this.

The first letter contained only informational content about the new quota law. The second letter emphasized the benefits of inclusion for PwD and was framed positively to align with social norms promoting inclusion. Finally, the third letter emphasized the penalties for non-compliance and was framed negatively to align with the deterrence approach commonly used in tax literature. We randomly assigned firms to receive one of these letters.

By analyzing the impact of each letter on compliance behavior, we sought to determine whether information alone was sufficient to drive compliance or if the framing of the message had a larger impact on PwD labor outcomes. We find that providing information to firms had a positive impact on the number of employees with disabilities at the firm level. This result is significant because it indicates that simply providing information about PwD inclusion policies and legal requirements can lead to positive outcomes.

However, we also found that this increase in the number of workers with disabilities was primarily due to reclassifications. This means that the firms reclassified existing employees as individuals with disabilities, rather than hiring new PwD employees. While this finding suggests that there is still room for improvement in hiring practices, it does highlight the importance of promoting awareness and understanding of PwD inclusion policies.

Additionally, our study revealed that the positive effect on the number of employees with disabilities was only significant within the informational treatment, and not for the benefits and fines treatments. This finding suggests that the framing of the message is critical in promoting behavior change. Specifically, providing information alone was more effective than emphasizing either the benefits of inclusion or the penalties for non-compliance.

Overall, our study provides important insights into the effectiveness of using informational letters to promote PwD inclusion in the workplace. By highlighting the impact of different types of letters and the importance of framing the message appropriately, we hope to contribute to the creation of more inclusive and diverse workplaces. Our findings can inform policy and decision-making at both the firm and government level, ultimately leading to greater PwD labor inclusion and a more equitable society.

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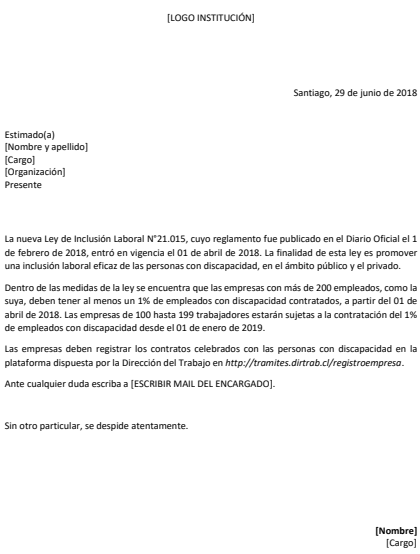
Appendix

A Experiment Design

A.1 Contents of the Letters



[LOGO INSTITUCIÓN]

Santiago, 29 de junio de 2018

Estimado(a)
[Nombre y apellido]
[Cargo]
[Organización]
Presente

La nueva Ley de Inclusión Laboral N°21.015, cuyo reglamento fue publicado en el Diario Oficial el 1 de febrero de 2018, entró en vigencia el 01 de abril de 2018. La finalidad de esta ley es promover una inclusión laboral eficaz de las personas con discapacidad, en el ámbito público y el privado.

Dentro de las medidas de la ley se encuentra que las empresas con más de 200 empleados, como la suya, deben tener al menos un 1% de empleados con discapacidad contratados, a partir del 01 de abril de 2018. Las empresas de 100 hasta 199 trabajadores estarán sujetas a la contratación del 1% de empleados con discapacidad desde el 01 de enero de 2019.

Las empresas deben registrar los contratos celebrados con las personas con discapacidad en la plataforma dispuesta por la Dirección del Trabajo en *http://tramites.dirtrab.cl/registroempresa*.

Ante cualquier duda escriba a [ESCRIBIR MAIL DEL ENCARGADO].

Sin otro particular, se despide atentamente.

[Nombre]
[Cargo]

Figure 1: Information Treatment

[LOGO INSTITUCIÓN]

Santiago, 29 de junio de 2018

Estimado(a)
[Nombre y apellido]
[Cargo]
[Organización]
Presente

La nueva Ley de Inclusión Laboral N°21.015, cuyo reglamento fue publicado en el Diario Oficial el 1 de febrero de 2018, entró en vigencia el 01 de abril de 2018. La finalidad de esta ley es promover una inclusión laboral eficaz de las personas con discapacidad, en el ámbito público y el privado.

Dentro de las medidas de la ley se encuentra que las empresas con más de 200 empleados, como la suya, deben tener al menos un 1% de empleados con discapacidad contratados, a partir del 01 de abril de 2018. Las empresas de 100 hasta 199 trabajadores estarán sujetas a la contratación del 1% de empleados con discapacidad desde el 01 de enero de 2019.

Las empresas deben registrar los contratos celebrados con las personas con discapacidad en la plataforma dispuesta por la Dirección del Trabajo en *http://tramites.dirtrab.cl/registroempresa*.

Según información entregada por la Organización Internacional del Trabajo (OIT), la exclusión de personas con discapacidad del mercado laboral tiene costos relacionados con la pérdida de productividad. El entorno social y físico hacen a las personas con discapacidad menos productivas de lo que podrían ser.

Dentro de las ventajas de la inclusión se encuentran que permite tener un acceso al talento a través de la atención en las competencias y no en los estereotipos. Existe un mayor nivel de innovación, ya que al tener empleados con experiencias diversas se aplican distintos enfoques para solucionar un problema. Existe un mayor sentido de pertenencia y una mayor retención en los empleados que se sienten integrados. Significa un beneficio para todos y para la institución, debido a que los consumidores valoran a las empresas realmente comprometidas con la inclusión.

Ante cualquier duda sobre la ley y sus beneficios, escriba a [ESCRIBIR MAIL DEL ENCARGADO].

Sin otro particular, se despide atentamente.

[Nombre]
[Cargo]

Figure 2: Benefits Treatment

[LOGO INSTITUCIÓN]

Santiago, 29 de junio de 2018

Estimado(a)
[Nombre y apellido]
[Cargo]
[Organización]
Presente

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El organismo encargado de la fiscalización del cumplimiento de la ley es la Dirección del Trabajo, la que podrá fiscalizar de manera presencial o vía electrónica, teniendo la facultad de solicitar a las empresas la información necesaria para acreditar el cumplimiento de la obligación. Las empresas están obligadas a entregar a la Dirección del Trabajo todos los antecedentes que sean requeridos. Por su parte, la Dirección del Trabajo y su personal deberán guardar reserva de la información que tomen conocimiento en virtud de lo solicitado a las empresas en el marco de la Ley N°21.015.

Las infracciones a las obligaciones que establece la ley serán sancionadas de acuerdo a lo prescrito en el Título final del Libro V del Código del Trabajo, el cual indica, entre otras medidas, que las empresas serán sancionadas según la gravedad de la infracción. Para la micro empresa y la pequeña empresa, la sanción ascenderá de 1 a 10 unidades tributarias mensuales. Para las medianas empresas, la sanción ascenderá de 2 a 40 unidades tributarias mensuales. Tratándose de grandes empresas, la sanción ascenderá de 3 a 60 unidades tributarias mensuales. En el caso de las multas especiales, el rango se podrá duplicar y triplicar.

Ante cualquier duda sobre la ley y los riesgos de su no cumplimiento escriba a [ESCRIBIR MAIL DEL ENCARGADO].

Sin otro particular, se despide atentamente.

[Nombre]
[Cargo]

Figure 3: Information Treatment

B Data Sources

Asociación del Fondo de Cesantía (AFC) Data from matched workers and firms corresponds to that of Chile's unemployment insurance system. This dataset collects the monthly payroll and contractual status (whether permanent or temporal contract) of its workers. Every 6 months the firms updates its location (The firm's HQ's comuna, Chile's smallest administrative division), *SII* industry (Chile's IRS 6 digit industry codes) and number of workers. The periodicity of this data is monthly, and it is used to assemble a matched employer-employee panel dataset.

Registro Nacional de Discapacidad (RND) The Registro Nacional de Discapacidad[15], is the main registry from which PwD can certify their disability situation and/or apply/get social benefits conditional on disability situations. The RND currently uses the ICF criteria recommended by the OMS in qualifying disability situations.

According to ENDISC 2015 there are 2,836,818 PwD in Chile, or 16,7% of the population. However, RND (up until December 2020) only has 396,201 registered PwDs, corresponding to 13,9% of the total PwD population.

The application procedure has three stages:

1. Disability Calification
    - By Comisión de Medicina Preventiva e Invalidez (COMPIN), supported by a multidisciplinary evaluation according to the ICF guidelines
2. Disability Certification
    - Disability Percentage
    - Disability Cause
    - Reduced Mobility Report
3. Registration at RND

Finally, these are the relevant historical dates on the RND registry:

- **1994** Enactment of Ley Number 19.284, creating the Registro Nacional de la Discapacidad[16]
    - Registration standards based on conditions or deficiencies (visual, auditive, speech, physical, mental and psychological) rather than capabilities
- **2012** Decreto 47, modifying RND registration standards to comply with the ICF criteria, focused on capabilities, and promoted by the OMS[17]
- **2018** Enactment of Ley Number 21.015, creating a 1% PwD quota for firms with over 200 workers. Expanded to firms with over 100 workers in 2019

[15] Dependent on the Registro Civil
[16] Link to RND at the Civil Registry
[17] Link to Quotas Law Enactment

Pensión de Discapacidad (IPS) An alternative certification of PwD status —as measured by the quota enforcing agency— is being a recipient of a disability pension. This is a regular monthly payment. We match this monthly payment indicator to our employer-employee dataset. This benefit is not mutually exclusive with other social programs contingent on an RND registration.