RIETI Discussion Paper Series 23-E-019

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RIETI Discussion Paper Series 23-E-019
March 2023

The Effects of Financial Incentives on Small and Medium-sized Enterprises' Demand for Workers with Disabilities: Evidence from changes in Japan's employment quota system[1]

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Abstract

This study evaluates whether a levy–grant system for disability employment promotes employment in small and medium-sized enterprises using administrative data recording the firms' employment of people with disabilities by law. We employ a 2015 policy change in Japan regarding the size of firms subject to the levy–grant system as a natural experiment and use the difference-in-differences method to examine the effect of the change. The results reveal several important findings. First, the policy change generally promotes the employment of people with disabilities in small and medium-sized enterprises in Japan. Second, we observe that firms originally employing workers with disabilities increase their number, while firms that did not originally employ any workers with disabilities start to hire them. Third, the treatment effects appear even before the policy implementation, indicating that prior announcements encouraged firms to secure people with disabilities with the appropriate skills for their firms at an early period. Fourth, a levy imposed for not achieving the legal employment rate is more effective than a grant paid for achieving the rate. Finally, we confirm the heterogeneity in policy effects by region and industry.

Keywords: disability employment, employment quota system, policy evaluation
JEL classification: J14, J23, J78

[1] This study is part of research conducted by the Research Institute of Economy, Trade and Industry (REITI) and Kobe University. The draft of this paper was presented in a DP seminar at RIETI. We would like to thank participants of the RIETI DP Seminar for their helpful comments. The authors are also grateful for helpful comments and suggestions by Yoichi Sekizawa, Shota Araki, Masayuki Morikawa, Masato Mizuno, Daigo Nakata, and Yoshio Higuchi. We also thank the staff of LITALICO, Inc. for their cooperation in providing the data.
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1 Introduction

The relative poverty and unemployment rates of people with disabilities are twice those of people without disabilities (Organisation for Economic Co-operation and Development [OECD] 2003, 2010; Yamada, Momose, and Shikata 2015). Surveys conducted in government agency reports indicate that the employment rate and income of people with disabilities are quite low and that they face problems in their daily lives.[1] Countries are implementing, on the one hand, policies aimed at social inclusion to promote the participation of persons with disabilities in economic and social life (OECD 2003) and, on the other hand, labor demand-side policies to promote employment of persons with disabilities.

In Japan, the legal employment rate for people with disabilities varies by firm size. According to the Ministry of Health, Labour and Welfare (MHLW) of Japan's 2018 Report on the Employment Status of Persons with Disabilities,[2] among companies that do not meet the legal employment rate for people with disabilities, only 0.1% of companies with 1,000 or more employees do not employ any people with disabilities, whereas 30.8% of companies with 100–300 employees do not employ people with disabilities. Therefore, although large companies in Japan are making progress in their efforts to employ people with disabilities, small and medium-sized enterprises (SMEs) are not making progress in their efforts to employ them.

In this study, we assess whether a levy–grant system for disability employment promotes employment among Japanese SMEs, using administrative data recording the firms' employment of people with disabilities by law. We deem that a natural experiment occurred when the size of companies subject to the levy–grant system changed in 2015 from companies with more than 200 employees to those with more than 100 employees. We then use such changes in financial incentives to verify whether employment of people with disabilities is promoted through the difference-in-differences (DID) method in SMEs.

Two legislative approaches have been used to promote employment of people with disabilities: antidiscrimination legislation and employment quotas. The former, which is antidiscrimination legislation, prohibits discrimination against persons with disabilities in all aspects of employment and the employment process. The latter, employment quotas, specify that employers should offer a specific proportion of jobs to

[1] Although the data is somewhat old, according to a 2006 survey in Japan, the employment rate of persons with disabilities is only 20%, and even when they are employed, one out of every three persons with disabilities earns less than 110,000 yen per month. See the Ministry of Health, Labour and Welfare (MHLW) of Japan website (https://www.mhlw.go.jp/toukei/saikin/hw/shintai/06/dl/01.pdf).

[2] See the MHLW of Japan website (https://www.mhlw.go.jp/content/11704000/000533049.pdf).

people with disabilities. The extant literature has extensively examined the effects of antidiscrimination legislation on people with disabilities. Antidiscrimination laws in the United States, the United Kingdom, and other countries have been shown to be negative or ineffective for the employment of people with disabilities (Acemoglu and Angrist 2001; Jones 2008). Conversely, employment quotas implemented in Europe, Japan, and Brazil using such methods as regression discontinuity design have been shown to have positive effects on the employment of people with disabilities (Agovino et al. 2019; de Araújo et al. 2021; Lalive et al. 2013; Mori and Sakamoto 2018). However, the discontinuity in employment quotas does not allow us to analyze policy effects in firms that employ either many people with disabilities or no people with disabilities at all, as they do not respond to employment quotas.

This study's contribution to the literature on disability employment is three-fold. First, we provide a broader analysis than that of existing studies that exploit discontinuities. Previously, some firms did not have to pay levies, even if they did not meet their employment quotas for people with disabilities. In our study, we define treatment groups as firms that have had to pay levies because of policy changes. Using this change, we examine the broader treatment effect. Second, we use the administrative data obtained from public information requests. These data have the advantage that there are few measurement errors or sample selection problems in the number of persons with disabilities employed, because companies report these data based on legal obligations. We exploit the unique panel data to examine not only the effect on firms that employed workers with disabilities before the policy change, but also the effect on firms that did not employ workers with disabilities before the policy change. In other words, we distinguish between the intensive and the extensive margins of the effect of financial incentives on firms' employment of people with disabilities. In particular, many SMEs in Japan do not employ people with disabilities at all, and whether the policy change has led them to employ people with disabilities or not could be an important policy implication. Third, we examine heterogeneity by region and industry. Prior studies face the problem of insufficient analysis by region and industry due to data limitations. Our results may have important implications for policy, practice, theory, and subsequent research.

The remainder of this paper is organized as follows. Section 2 describes the employment system for people with disabilities in Japan. Section 3 presents the data and empirical strategy. Section 4 presents and discusses the results of the analysis. Section 5 summarizes the study.

2 Japan's Employment Promotion System for People with Disabilities

The Japanese government mandates an employment quota system for people with disabilities.[3] Under this system, administered by the Japan Organization for Employment of the Elderly, Persons with Disabilities and Job Seekers, firms are required to file a form that reports companies' total number of regular workers and the number of disability workers to the Public Employment Security Office managed by the national government every June. Before March 2013, the employment quota for employees with disabilities for private companies of a certain size was the equivalent of 1.8% of the employers' total workforce. Japan increased the employment quota of people with disabilities to 2.0% in April 2013, 2.2% in April 2018, and 2.3% in March 2021. To calculate the quota, employees who worked 30 hours or more per week were defined as regular workers and rounded down to the nearest whole number.[4] For instance, if the legal employment rate is 2.0%, a company with 160 regular workers would assign three employees (160*0.02 = 3.2, rounded down to the nearest whole number) to meet the quota for workers with disabilities. A certain percentage of the employment quota is exempted for industries in which hiring people with disabilities is more difficult than in other industries. For example, the construction industry is exempt from the 40% of regular workers used in the calculation of the number of the quota for workers with disabilities. The number of workers with disabilities is calculated by multiplying the number of regular workers by (1−0.4), which is the number of adjusted regular workers. Other Japanese policies to promote the employment of people with disabilities include a special subsidiary system that is mainly used by large employers. In this system, an employer can establish a special subsidiary company in which people with disabilities can work in an environment suited to workers both with and without disabilities, and employees with disabilities count toward the parent company's disability employment quota in the calculation of the actual disability employment rate, when these firms meet certain conditions.[5]

Initially, companies with fewer than or equal to 300 regular workers were not legally obligated to levy even if they failed to achieve the quota, but this was changed to companies with fewer than or equal to 200 regular workers in 2010, and then to fewer than or equal to 100 regular workers in 2015. At the time of writing, companies that do

[3] We refer to Sakamoto and Mori (2017) and Mori and Sakamoto (2018) in explaining the employment quota system.
[4] Part-time workers who work between 20 and 30 hours are counted in the number of regular employees as 0.5 person.
[5] There are other efforts to promote the employment of workers with disabilities. For example, various subsidies for employment of people with disabilities, a double-counting system whereby persons with severe disabilities are hired at twice the rate of persons with normal disabilities, and a job coach dispatch program to advise people with disabilities on how to improve their workplace environment and work style. Since these efforts are not major policy changes, they are not discussed in detail in this study.

not comply with the quota must pay a monthly levy of 50,000 yen per worker with a disability, which is then distributed to firms that exceed the employment quota as a grant.[6] If companies employ more than a certain number of people with disabilities, they can receive either a Grant (*Choseikin*) or a Reward (*Hoshokin*). The Grant is 27,000 yen per person with disabilities per month for companies with 101 or more regular workers, if they exceed the employment quota. Thus, the levy–grant system allows a greater distribution of levy-based funds to compensate firms that exceed the employment quota for the financial outlay required for training, workplace modifications, and other expenditures incurred to fulfill the employment quota. Companies with fewer than or equal to 100 regular workers do not have to pay the levy, even if they do not meet the legal employment rate. However, if the number of people with disabilities employed by companies exceeds a certain number, these companies will receive the Reward of 21,000 yen multiplied by the number of people with disabilities exceeding that number. The number is the annual total of 4% of the number of regular workers in each month or 72 (i.e., six workers with disabilities per month), whichever is greater. The employment quotas for firm i can be summarized in Equations 1, 2, and 3 below, using the 2015–2017 period as an example. Note that a_i indicates the exemption rate, and L_i indicates the number of regular workers.

$$Levy\ Quota_i = 0.02 \times (1 - a_i)L_i\ if\ L_i > 100 \quad (1)$$

$$Reward\ Quota_i = \ min\ [(0.04 \times L_i), 6]\ if\ L_i \leq 100 \quad (2)$$

$$Grant\ Quota_i = Levy\ Quota_i\ if\ L_i > 100 \quad (3)$$

Based on the above, Table 1 summarizes the changes in policies to promote disability employment in Japan described in Section 2.[7]

3 Data and Methods

3.1 Data

We use Japan's MHLW reports on the employment status of persons with disabilities that are based on data released annually by certain employers in June. The data are obtained by LITALICO Inc., which operates in the field of welfare of adults and children with disabilities, following a request for information. We use the data with

[6] For employers with 101 to 200 or fewer regular workers, the amount of the levy is reduced to 40,000 yen per person with disabilities per month from April 1, 2015 to March 31, 2020.

[7] Japan's Ministry of Economy, Trade and Industry survey implies that the implementation of the 2016 antidiscrimination legislation shown in Table 1 was not very effective, although there are no empirical studies in Japan (https://www.meti.go.jp/policy/economy/jinzai/shougai/downloadfiles/2016tyosa_sabetsukaisho_meti.pdf).

the company's permission. These data include firm names, addresses, number of adjusted regular workers, and number of workers with disabilities. The number of adjusted regular workers is used to calculate the number of workers with disabilities that firms must hire. There are two limitations to this data. First, for technical reasons, such as the readability of the disclosed data, data from firms located in 3 of the 47 prefectures cannot be used in the analysis. It should also be noted that the balanced panel data is limited to firms located in 36 of these prefectures. Second, although we obtain 2010–2019 panel data, only firms that did not achieve the legal employment rate in most prefectures were reported in 2010 and 2011, and thus, we use the available 2012–2019 data.

Considering the heterogeneity of firms, we analyze them separately by 18 industry sectors. Nakajima et al. (2005) suggested that a stricter employment quota system by raising the levy reduces the number of firms that have not achieved the legal employment rate. We consider firms that had achieved the legal employment rate before the policy change and those that had not to be heterogeneous, and thus, we analyze them separately. Through this analysis, we examine the impact of the incentive scheme for disability employment on SMEs that did not achieve the legal employment rate—a situation that has become problematic in Japan. Whether a company meets the legal employment rate is assessed for 2014 before the policy change. According to Japan's MHLW, the ratio of the number of people with disabilities employed to the number of new job openings for people with disabilities varies by region. Given that the accessibility of employment for people with disabilities is heterogeneous across regions, we divide the analysis into two groups of prefectures: those with high and those with low rate of filling job vacancies for people with disabilities. The groups of prefectures with a higher rate of filling job vacancies for people with disabilities in the Aomori, Iwate, Akita, Yamagata, Niigata, Yamanashi, Nagano, Shiga, Kyoto, Nara, Wakayama, Tottori, Shimane, Hiroshima, Yamaguchi, Kochi, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, and Kagoshima prefectures. The groups of prefectures with a lower rate of filling job vacancies for people with disabilities in the Hokkaido, Miyagi, lbaragi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Toyama, Ishikawa, Fukui, Gifu, Shizuoka, Aichi, Mie, Osaka, Hyogo, Tokushima, Kagawa, Ehime, Fukuoka, and Okinawa prefectures.[8] Considering the above prefectures, the groups of prefectures with a lower rate of filling job vacancies for people with disabilities tend to be located more in urban areas.[9]

[8] Refer to the MLHW (https://www.mhlw.go.jp/content/11704000/000469913.pdf)

[9] Since stricter employment quotas encourage the hiring of persons with mild disabilities and may crowd out persons

3.2 Methods

We examine the effect of the 2015 change in the size of companies subject to the levy–grant system from firms with more than 200 employees to those with more than 100 employees. Because firm size is a choice variable, firms may respond to the policy. For example, firms may set the number of regular workers fewer than or equal to 100 to avoid the impact of policy change in 2015, or they may set the number of regular workers higher than 100 to receive the Grant. To circumvent the influence of time-varying treatment conditions, we define the treatment variable using a baseline pre-treatment measure of firm size (e.g., Boeri and Jimeno 2005; Cruz and Rau 2022), and use the 2014 pre-treatment year as our baseline. Based on the above, the treatment group is defined as enterprises with more than 100 to 200 or fewer employees in 2014. The control group was defined as those firms with fewer than or equal to 100 employees in 2014, and thus, we examine the effect of the 2015 policy change on SMEs that were not making progress in their efforts to hire people with disabilities. However, firms may still manipulate the number of regular workers, which could create a bias in the estimation. Therefore, we also present results using 2013 as the baseline for firm size to check robustness.

We estimate Equation 4 using the DID method.[10]

$$y_{it} = \alpha + \gamma Treat_i + \lambda after_t + \delta(Treat_i \cdot after_t) + X'_{it}\beta + \mu_{it}, \quad (4)$$

where y_{it} is the employment rate of people with disabilities in year t for firm i. In addition, we estimate a linear probability model with a dummy variable as y_{it}, with 0 for firms that employ no persons with disabilities at all and 1 for firms that employ at least one person with a disability. Because, as discussed in Section 1, many SMEs do not employ people with disabilities at all, discussing not only the number of people with disabilities (intensive margin) but also whether they employ people with disabilities (extensive margin) makes more sense from a policy perspective.[11] $Treat_i$ is a dummy

with severe disabilities, an analysis by disability type is required. However, the disclosed data we obtain do not record the number of persons with mild and severe disabilities, nor the number of employees by disability type (physical disability, intellectual disability, and mental disability). According to the Report on the Employment Status of Persons with Disabilities by the MHLW, the aggregate results by disability type show that the trend in the actual number of employees by disability type has not changed significantly during the analysis period. Therefore, this study does not consider the impact of the crowding out of persons with severe disabilities to be large.

[10] Recent literature has focused on the issue of heterogeneity of treatment effects in staggered DID with different treatment periods (Baker et al. 2022). However, this study is not subject to this issue, because the treatment period is only 2015.

[11] In the case of companies that met the legal employment rate, all firms employ at least one person with a disability

variable that takes the value of 1 for the group of firms with 101 to 200 or fewer employees affected by the 2015 policy change and 0 for the group of firms with fewer than or equal to 100 employees. $after_t$ is a dummy variable that is 0 before the policy change in 2015 and 1 after the policy change. Then, δ denotes the treatment effect of the policy change we focus on. X'_{it} denotes the control variables. As for the controls, we use a flexible fourth-order polynomial number of adjusted regular workers following Mori and Sakamoto (2018).[12] We also use a dummy for companies with special subsidiaries, year dummies, and prefecture dummies. μ_{it} is the error term.

We estimate Equation 5 to check the effects of the policy change in 2015 over time (e.g., Yoo and Kang 2012).

$$y_{it} = \alpha + \gamma Treat_i + \lambda_t + \sum_{\tau=0}^{4} \delta_\tau (Treat_i \cdot \lambda_{t+\tau}) + X'_{it}\beta + \mu_{it}, \quad (5)$$

where λ_t is the year dummy with the benchmark year of 2013 and the interaction terms between the treatment dummy and the year dummies denote δ_τ.

The legal employment rate for people with disabilities in Japan was revised in 2013, 2018, and 2021. Some firms were affected by the revisions, while others were not, depending on their employment quota threshold status. To avoid this impact, we limit our sample to the years 2013–2017, when the legal employment rate was constant at 2.0%.

Tables 2 and 3 present descriptive statistics and the employment rates of people with disabilities for the total sample and subsample, respectively.[13] The disability employment rate is much higher for companies that meet the legal disability employment rate than for companies that do not meet it. Prefectures with a higher rate of filling job vacancies have a lower disability employment rate than prefectures with a lower rate of filling job vacancies. Regarding industries, the disability employment rate is the highest in the medical, health care, and welfare sectors, except for agriculture and forestry as well as mining and quarrying of stone and gravel, which have small sample sizes. Although the manufacturing and the wholesale and retail trade sectors include a

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before the policy change, and thus, we do not analyze them in the linear probability model that focuses on whether or not the firm employs a person with a disability.

[12] y_{it} should be verified by the number of workers with disabilities if there are companies that achieve the legal employment rate by reducing the number of regular workers. However, since the number of regular workers is controlled, an increase in the employment rate with the number of regular workers constant would imply an increase in the actual number of workers with disabilities. Therefore, it is unnecessary to estimate y_{it} by the number of workers with disabilities.

[13] Firms with employment rates exceeding 100% are excluded from the analysis because they are considered to be a reporting error.

large number of companies and employ a large number of people with disabilities, their disability employment rates are ranked in the middle among the industries surveyed.

Figure 1 compares trends for the treatment and control groups. The treatment group has a higher employment rate than the control group, with a steeper slope from 2014 to 2015 after the policy change. Thus, the 2015 policy change appears to be effective.

4 Results and Discussion

Table 4 presents the estimation results.[14] The variables indicating treatment effects are statistically significant for all subsamples. Thus, the results indicate that the policy changes encouraged firms to hire people with disabilities. According to (ii) in Table 4, the increase in the employment rate is observed not only in the intensive margin but also in the extensive margin, as the policy change increases the probability that a firm employs at least one person with a disability. Therefore, we find that the policy changes in 2015 have effects even on firms that have not employed persons with disabilities. It is also important to determine whether this effect is economically significant. According to the estimated coefficients in (i) of Table 4, the effects were approximately 0.1 percentage points, which may be small compared with the legal employment rate of 2% during this period. However, the size of the effect may be reasonable considering that Japan's employment policy for the disability employment has recently raised the legal employment rate at a moderate level of 0.1 to 0.2 percentage points. Furthermore, the estimated coefficient in Table 4 (ii) on the probability of employing one or more persons with disabilities is around 3 percentage points; given that 30.8% of SMEs do not employ persons with disabilities at all, as discussed in Section 1, this effect also appears to be of non-negligible size.

Table 5 shows the estimation results by industry. When the outcome is the employment rate of persons with disabilities, the treatment effects are statistically significant for the mining and quarrying of stone and gravel; manufacturing; information and communications; transport and postal activities; wholesale and retail trade; real estate and goods rental and leasing; accommodations, eating, and drinking services sectors; and services, n.e.c. When the dummy variable is whether or not persons with disabilities are employed, the treatment effect is similar to the case in which the outcome is the employment rate of persons with disabilities, except for construction; scientific research, professional and technical services; living-related and

[14] Here, we use unbalanced panel data for 44 prefectures, excluding Fukushima, Tochigi, and Okayama, which lack data for 2014, before the policy change. Note that the results do not change significantly when we use a balanced panel of 36 prefectures with no missing data.

personal services and amusement service; transport and postal activities; and real estate and goods rental and leasing. Note that the number of firms affiliated with the mining and quarrying of stone and gravel and fisheries sectors is very small, whereas the number of firms in other industries is large enough. Of these, the manufacturing and wholesale and retail trade sectors have been actively employing people with disabilities in Japan. This suggests that, for these industries, the marginal cost of employing persons with disabilities was lower than the levy, and after the levy was applied, they might have increased employment from a profit maximization perspective. By contrast, industries in which the effect is not statistically significant might not have a competitive market, or many firms might have already achieved the legal employment rate to comply with the law. For example, the medical, health care, and welfare sector—which has a large number of companies and a high employment rate of persons with disabilities—does not show statistically significant results.

Table 6 indicates the effect on the employment rate of persons with disabilities in the periods before and after the policy change, using 2013 as the benchmark year. As for all samples, for companies that did not meet the legal employment rate before the policy change, and prefectures with a lower rate of filling job vacancies for people with disabilities, the treatment effect is statistically significant even before the 2015 policy change. This suggests that some firms prepared early because the 2015 policy change was actually announced in 2009, and because it takes time to hire suitable workers with disabilities that firms are looking for due to labor market frictions. By contrast, the treatment effect on firms that met the legal employment rate before the policy change is different. For these firms, the treatment effect before the 2015 policy change is not statistically significant; the effect size after the 2015 policy change is smaller than for firms that did not meet the legal employment rate before the policy change. Note that in our data, only about 10% of firms had a high enough employment rate of persons with disabilities to receive the Reward before the policy change.[15] This means that most of these firms that were active in employing persons with disabilities could have received the new grant if they expanded their employment of persons with disabilities beyond the legal employment rate after the policy implementation. Therefore, the effect of the application of the grant on employment of persons with disabilities is considered

[15] Detailed data on the firms that met the legal employment rate before the policy change are as follows: 12.26% of the firms with 101–124 employees employed 5 or more persons with disabilities and met the conditions for receiving the Reward. Among the firms with 125–149 employees, 8.51% employed 6 or more persons with disabilities and met the conditions for receiving the Reward; among the firms with 150–174 employees, 8.84% employed 7 or more people with disabilities and met the conditions; and among companies with 175–199 employees, 6.21% employed 8 or more people with disabilities and met the conditions. In other words, most of the firms that met the legal employment rate did not receive the Reward before the policy change, and the incentive of the Grant was given to the firms after the policy change.

smaller than the effect of the application of the levy.

As for the analysis by region, the coefficients are larger in prefectures with a lower rate of filling job vacancies for people with disabilities than in prefectures with a higher rate, and the effects are observed even before the policy change. These prefectures tend to be relatively urban and provide more employment opportunities for people with disabilities. Therefore, we assume that financial incentives in such areas would influence companies that consider the employment of people with disabilities.

For the post-policy change period, the effects generally grow as time passes. The point estimates of these policy effects are summarized in Figure 2. We speculate that the reason for this effect over time is that, as mentioned Section 4, there is some friction in matching companies with people with disabilities, which takes some time.

As discussed in Section 3, we present results using 2013 as the baseline for firm size in Table 7. The results are generally similar, although there are differences in significance and coefficient size. Therefore, we believe that manipulation of firm size through policy changes in 2015 was minimal.

5 Conclusion

In this study, we evaluated whether the levy–grant system for disability employment would promote employment in SMEs in Japan. We used administrative data documenting the firms' employment of persons with disabilities by law to examine the effects of Japan's quota policy, including financial incentives for firms. Specifically, we focus on a natural experiment in which the levy and grant imposed changes from firms with more than 200 employees to those with more than 100 employees, depending on the achievement of the legal employment rate for people with disabilities, and use the DID approach to identify the causal effect of this change on the employment of persons with disabilities.

The results showed that the policy changes have generally promoted the employment of people with disabilities in SMEs in Japan. We found that the increase in the employment rate of persons with disabilities due to the policy change in 2015 is observed not only in the intensive margin, but also in the extensive margin, as the policy change increased the probability that a firm employs at least one person with a disability. This finding is important because many SMEs that previously employed no persons with disabilities at all began to newly hire persons with disabilities as a result of this policy change in 2015. Moreover, since the treatment effects appeared even before the policy change in 2015, some companies prepared early and secured employees with disabilities who had the appropriate skills for their companies. Furthermore, the results

showed that the effect of the levy imposed for not achieving the legal employment rate was larger than that of the grant paid for achieving the rate. As a policy implication, at least in terms of promoting the quantitative employment of persons with disabilities, enhanced financial incentives for the demand side of employment of persons with disabilities would be effective. In particular, imposing levies on firms that do not employ persons with disabilities is likely to encourage the employment of persons with disabilities.

In terms of heterogeneity by region, policies may not be effective unless there are employment opportunities for people with disabilities in an area with fewer places for them to work. Further research is required to determine if a uniform national disability employment policy will be problematic. Furthermore, in terms of heterogeneity across industries, policies that provide financial incentives may not be effective in industries that do not operate in a competitive market environment. Although such policies can be implemented by industries, caution must be exercised in their promotion.

We describe some future issues to be addressed. First, this study was not able to verify the validity of the levy and the grant amounts. Future analysis should consider the amount of a levy–grant system. Second, this study analyzed the period 2013–2017, a time of economic recovery and labor shortages in Japan. Therefore, the treatment effect may reflect this macroeconomic situation. Future research should examine policy effects in other economic cycles, such as recessionary periods. Third, it is necessary to further examine the implications of regional heterogeneity. While this study found that the effect was higher in prefectures with higher employment rates, future research should clarify detailed heterogeneity factors. Finally, this study focused on the quantitative outcome of the employment rate of persons with disabilities. However, future researchers, policymakers, and stakeholders must focus on the underlying concept of disability employment policies, which is the normalization of disability in the workplace—and not the accommodation of people with disabilities—and the objective of employing the largest possible number of people both with and without disabilities.

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Table 1 Changes in Japan's disability employment policies

Year	Legal employment rate for private firms (%)	Minimum firm size subject to the obligation to employ persons with disabilities (persons)	Minimum firm size eligible to pay the Levy and receive the Grant (persons)	Other changes
2010	1.8	56	More than 200	
2011	1.8	56	More than 200	
2012	1.8	56	More than 200	
2013	**2.0**	**50**	More than 200	
2014	2.0	50	More than 200	
2015	2.0	50	**More than 100**	
2016	2.0	50	More than 100	The implementation of Act for Eliminating Discrimination against Persons with Disabilities and the revised Act to Facilitate the Employment of Persons with Disabilities
2017	2.0	50	More than 100	
2018	**2.2**	**45.5**	More than 100	Add mentally people with disabilities to the calculation base of the legal employment rate
2019	2.2	45.5	More than 100	
2020	2.2	45.5	More than 100	
2021	2.3	**43.5**	More than 100	

Source: Compiled based on the Ministry of Health, Labour and Welfare (MHLW) of Japan website (https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/koyou/shougaishakoyou/index.html), Japan Organization for Employment of the Elderly, Persons with Disabilities and Job Seekers website (https://www.jeed.go.jp/disability/koyounohu/index.html), and Sakamoto and Mori (2017).

Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Employment rate	266,025	1.5289	3.1891	0	100
Employment dummy	266,025	0.6025	0.4894	0	1
Firm size between 101 and 200	266,025	0.4085	0.4916	0	1
After the 2015 policy change	266,025	0.5815	0.4933	0	1
Firm size between 101 and 200 * After the 2015 policy change	266,025	0.2399	0.4270	0	1
Adjusted regular workers	266,025	98.1443	77.4810	44	21,609
Companies with special subsidiary company	266,025	0.0002	0.0138	0	1
Agriculture and forestry	266,025	0.0011	0.0327	0	1
Fisheries	266,025	0.0001	0.0075	0	1
Mining and quarrying of stone and gravel	266,025	0.0003	0.0162	0	1
Construction	266,025	0.0178	0.1322	0	1
Manufacturing	266,025	0.1235	0.3290	0	1
Electricity, gas, heat supply and water	266,025	0.0011	0.0333	0	1
Information and communications	266,025	0.0232	0.1505	0	1
Transport and postal activities	266,025	0.0319	0.1756	0	1
Wholesale and retail trade	266,025	0.0742	0.2620	0	1
Finance and insurance	266,025	0.0051	0.0711	0	1
Real estate and goods rental and leasing	266,025	0.0076	0.0869	0	1
Scientific research, professional and technical services	266,025	0.0132	0.1140	0	1
Accommodations, eating and drinking services	266,025	0.0104	0.1012	0	1
Living-related and personal services and amusement services	266,025	0.0120	0.1091	0	1
Education, learning support	266,025	0.0095	0.0970	0	1
Medical, health care and welfare	266,025	0.0557	0.2294	0	1
Compound services	266,025	0.0037	0.0610	0	1
Services, n.e.c	266,025	0.0381	0.1915	0	1

Note: “Firm size between 101 and 200” means the treatment dummy and “After the 2015 policy change” means the dummy variable after the 2015 policy change. “Firm size between 101 and 200 * After the 2015 policy change treatment group” is the intersection term of the variables mentioned earlier. In “special subsidiary company” system, an employer can establish a special subsidiary company in which people with disabilities can work in an environment suited to workers both with and without disabilities, and employees with disabilities count toward the parent company’s disability employment quota in the calculation of the actual disability employment rate, when these firms meet certain conditions.

Table 3 Employment rate of people with disabilities by subsample

Variable	Obs	Mean	Std. Dev.	Min	Max
Companies that met the legal employment rate before the 2015 policy change	144,817	0.43	0.88	0	68.97
Companies that did not meet the legal employment rate before the 2015 policy change	121,208	2.84	4.27	0	100
Prefectures with a higher rate of filling job vacancies for people with disabilities	197,627	1.40	2.86	0	100
Prefectures with a lower rate of filling job vacancies for people with disabilities	68,398	1.89	3.97	0	98.39
Agriculture and forestry	285	2.32	4.47	0	34.21
Fisheries	15	0.42	0.61	0	1.37
Mining and quarrying of stone and gravel	70	2.30	1.91	0	5.66
Construction	4,735	1.39	1.60	0	15.48
Manufacturing	32,860	1.73	2.78	0	79.31
Electricity, gas, heat supply and water	295	1.23	1.20	0	5.23
Information and communications	6,170	0.67	1.01	0	8.70
Transport and postal activities	8,475	1.66	2.07	0	24.79
Wholesale and retail trade	19,730	1.02	1.45	0	30.49
Finance and insurance	1,350	1.07	1.06	0	5.69
Real estate and goods rental and leasing	2,025	1.04	1.53	0	15.18
Scientific research, professional and technical services	3,505	0.97	1.31	0	16.74
Accommodations, eating and drinking services	2,755	1.35	1.44	0	13.04
Living-related and personal services and amusement services	3,205	2.07	4.84	0	54.37
Education, learning support	2,525	1.02	1.29	0	15.50
Medical, health care and welfare	14,830	2.28	4.49	0	100
Compound services	995	1.49	1.61	0	9.23
Services, n.e.c	10,140	1.56	2.18	0	41.38

Note: Since the ratio of the number of people with disabilities employed to the number of new job openings for people with disabilities varies by region, we define prefectures with high ratios as “Prefectures with a higher rate of filling job vacancies for people with disabilities” and those with low ratios as “Prefectures with a lower rate of filling job vacancies for people with disabilities.”

Table 4 Results

(i) Employment rate of persons with disabilities

	All	Companies that meet the legal employment rate	Companies that do not meet the legal employment rate	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200	0.245***	0.317***	0.152***	0.212**	0.263***
	(0.0316)	(0.0584)	(0.0120)	(0.0955)	(0.0313)
After the 2015 policy change	0.199***	0.0437*	0.333***	0.203***	0.198***
	(0.0128)	(0.0253)	(0.00785)	(0.0268)	(0.0145)
Firm size between 101 and 200 *	0.133***	0.134***	0.159***	0.130***	0.131***
After the 2015 policy change	(0.0130)	(0.0248)	(0.00952)	(0.0308)	(0.0141)
Adjusted regular workers	-0.00202***	-0.0128***	0.00395***	-0.00623	-0.00219***
	(0.000409)	(0.00108)	(0.000195)	(0.00495)	(0.000380)
Adjusted regular workers squared	0.000000690*	0.0000116***	-0.00000229***	0.0000263	0.000000968***
	(0.000000371)	(0.00000220)	(0.000000382)	(0.0000236)	(0.000000278)
Adjusted regular workers cubed	-6.44e-11	-2.63e-09***	3.03e-10***	-3.50e-08	-1.02e-10***
	(4.90e-11)	(6.12e-10)	(9.68e-11)	(2.34e-08)	(3.62e-11)
Adjusted regular workers quartered	1.71e-15	1.59e-13***	-9.48e-15**	9.40e-12*	2.87e-15***
	(1.51e-15)	(3.99e-14)	(3.77e-15)	(5.57e-12)	(1.11e-15)
Companies with special subsidiary company	7.401***	6.979***	6.919**	10.68***	3.438*
	(1.782)	(1.927)	(3.308)	(2.099)	(1.996)
Year dummy	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes
Constant	1.680***	3.905***	-0.0609***	1.881***	1.684***
	(0.0687)	(0.138)	(0.0197)	(0.259)	(0.0683)
N	266025	121208	144817	68398	197627
adj. R-sq	0.018	0.013	0.151	0.009	0.016

(ii) Linear probability model with dummy variable where 0 is a firm that employs no persons with disabilities at all and 1 is a firm that employs at least one person with a disability

	All	Companies that do not meet the legal employment rate	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200	0.0866***	0.149***	0.0492***	0.0894***
	(0.00519)	(0.00785)	(0.0107)	(0.00602)
After the 2015 policy change	0.0691***	0.147***	0.0669***	0.0687***
	(0.00255)	(0.00343)	(0.00506)	(0.00296)
Firm size between 101 and 200 *	0.0303***	0.0385***	0.0210***	0.0360***
After the 2015 policy change	(0.00295)	(0.00446)	(0.00577)	(0.00343)
Adjusted regular workers	0.00310***	0.00504***	0.00642***	0.00314***
	(0.0000672)	(0.000243)	(0.000428)	(0.0000710)
Adjusted regular workers squared	-0.00000120***	-0.00000307***	-0.0000175***	-0.00000118***
	(0.000000118)	(0.000000753)	(0.00000179)	(0.000000102)
Adjusted regular workers cubed	1.26e-10***	5.09e-10***	1.41e-08***	1.22e-10***
	(1.73e-11)	(1.90e-10)	(1.69e-09)	(1.49e-11)
Adjusted regular workers quartered	-3.55e-15***	-1.75e-14**	-3.08e-12***	-3.42e-15***
	(5.51e-16)	(7.19e-15)	(3.95e-13)	(4.76e-16)
Companies with special subsidiary company	0.167*	0.598**	0.282***	0.126
	(0.0892)	(0.304)	(0.0381)	(0.110)
Year dummy	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes
Constant	0.259***	-0.236***	0.119***	0.252***
	(0.00932)	(0.0155)	(0.0265)	(0.00953)
N	266025	144817	68398	197627
adj. R-sq	0.141	0.333	0.111	0.142

Note 1: Cluster standard errors for each individual firm level are shown in parentheses.

Note 2: ***p<0.01, **p<0.05, *p<0.1.

Note 3: “Firm size between 101 and 200” means the treatment dummy and “After the 2015 policy change” means the dummy variable after the 2015 policy change. “Firm size between 101 and 200 * After the 2015 policy change treatment group” is the intersection term of the variables mentioned earlier. In “special subsidiary company” system,

an employer can establish a special subsidiary company in which people with disabilities can work in an environment suited to workers both with and without disabilities, and employees with disabilities count toward the parent company's disability employment quota in the calculation of the actual disability employment rate, when these firms meet certain conditions. In addition, since the ratio of the number of people with disabilities employed to the number of new job openings for people with disabilities varies by region, we define prefectures with high ratios as "Prefectures with a higher rate of filling job vacancies for people with disabilities" and those with low ratios as "Prefectures with a lower rate of filling job vacancies for people with disabilities."

Table 5 Results by industry sector

(i) Employment rate of persons with disabilities

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200	2.501	1.160***	-4.863*	-0.0813	-0.0457	-0.165
	(2.442)	(0.00221)	(2.515)	(0.160)	(0.107)	(0.535)
After the 2015 policy change	0.462**	0.00984	-0.913	0.197***	0.105***	-0.00848
	(0.180)	(0.00641)	(0.596)	(0.0566)	(0.0232)	(0.201)
Firm size between 101 and 200 *	-0.0561	-0.00852	1.547**	0.0681	0.143***	0.278
After the 2015 policy change	(0.233)	(0.00404)	(0.616)	(0.0575)	(0.0279)	(0.261)
Adjusted regular workers	0.272	0.0395	-2.994*	-0.0397**	-0.0149	0.215
	(0.541)	(0.705)	(1.525)	(0.0200)	(0.0116)	(0.321)
Adjusted regular workers squared	-0.00295	0.00168	0.0449*	0.000292**	0.0000988	-0.00289
	(0.00639)	(0.0147)	(0.0223)	(0.000144)	(0.0000711)	(0.00392)
Adjusted regular workers cubed	0.0000126	-0.0000398	-0.000282*	-0.000000758*	-0.000000211	0.0000155
	(0.0000320)	(0.000134)	(0.000136)	(0.000000401)	(0.000000163)	(0.0000199)
Adjusted regular workers quartered	-1.88e-08	0.000000214	0.000000641*	6.31e-10*	1.20e-10	-2.85e-08
	(5.78e-08)	(0.000000452)	(0.000000300)	(3.68e-10)	(9.94e-11)	(3.58e-08)
Companies with special subsidiary company	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.409	-2.241	72.97*	3.328***	2.822***	-3.794
	(16.10)	(12.49)	(36.70)	(0.855)	(0.579)	(9.202)
N	285	15	70	4735	32860	295
adj. R-sq	0.082	1.000	0.786	0.071	0.017	0.132

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200	-0.104	1.647***	0.0781	0.0520	-0.0621	0.0809
	(0.0819)	(0.138)	(0.0958)	(0.229)	(0.250)	(0.155)
After the 2015 policy change	0.139***	0.273***	0.121***	0.0872	0.186**	0.0986
	(0.0341)	(0.0526)	(0.0213)	(0.0863)	(0.0870)	(0.0687)
Firm size between 101 and 200 *	0.110***	0.120**	0.144***	0.105	0.158*	0.121
After the 2015 policy change	(0.0373)	(0.0587)	(0.0248)	(0.0883)	(0.0895)	(0.0740)
Adjusted regular workers	-0.0122	-0.0964***	-0.00451	0.00116	-0.0674*	-0.00888
	(0.00931)	(0.0324)	(0.00457)	(0.0230)	(0.0358)	(0.00759)
Adjusted regular workers squared	0.000144**	0.000378	0.0000313	0.0000644	0.000582**	0.0000527
	(0.0000661)	(0.000309)	(0.0000211)	(0.000156)	(0.000289)	(0.0000344)
Adjusted regular workers cubed	-0.000000472**	-6.07e-08	-4.92e-08	-0.000000308	-0.00000191**	-7.06e-08*
	(0.000000184)	(0.00000121)	(3.05e-08)	(0.000000418)	(0.000000913)	(4.18e-08)
Adjusted regular workers quartered	4.47e-10***	-1.07e-09	1.37e-11	3.48e-10	1.99e-09**	1.03e-11*
	(1.65e-10)	(1.59e-09)	(8.42e-12)	(3.68e-10)	(9.38e-10)	(6.01e-12)
Companies with special subsidiary company	0	0	6.591***	0	0	1204.1*
	(.)	(.)	(1.195)	(.)	(.)	(686.7)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.101**	6.393***	1.096***	0.306	3.329**	1.688***
	(0.457)	(1.149)	(0.253)	(1.097)	(1.440)	(0.463)
N	6170	8475	19730	1350	2025	3505
adj. R-sq	0.085	0.145	0.042	0.094	0.041	0.057

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200	0.106	0.297	-0.0975	-0.305	-0.633	0.0296
	(0.131)	(0.517)	(0.134)	(0.188)	(0.404)	(0.120)
After the 2015 policy change	0.250***	0.169**	-0.00421	0.290***	0.0672	0.193***
	(0.0770)	(0.0853)	(0.0750)	(0.0535)	(0.112)	(0.0479)
Firm size between 101 and 200 *	0.228***	0.0854	0.109	0.0872	0.192	0.141***
After the 2015 policy change	(0.0825)	(0.106)	(0.0773)	(0.0575)	(0.119)	(0.0485)
Adjusted regular workers	-0.000653	0.0761	-0.0152	-0.0354	-0.323	-0.00660
	(0.00172)	(0.128)	(0.0323)	(0.0333)	(0.237)	(0.00549)
Adjusted regular workers squared	0.000000188	-0.000618	0.000198	0.000428*	0.00399	0.0000267
	(0.00000208)	(0.00130)	(0.000293)	(0.000260)	(0.00290)	(0.0000258)
Adjusted regular workers cubed	3.32e-11	0.00000181	-0.000000833	-0.00000159**	-0.0000200	-4.14e-08
	(5.34e-10)	(0.00000543)	(0.00000106)	(0.000000781)	(0.0000149)	(4.08e-08)
Adjusted regular workers quartered	-4.26e-15	-1.67e-09	1.11e-09	1.65e-09**	3.54e-08	2.06e-11
	(3.39e-14)	(7.86e-09)	(1.29e-09)	(7.43e-10)	(2.75e-08)	(1.95e-11)
Companies with special subsidiary company	0	0	0	0	0	3.271**
	(.)	(.)	(.)	(.)	(.)	(1.339)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.196***	1.203	1.529	2.936**	10.43	2.052***
	(0.230)	(4.306)	(1.210)	(1.472)	(6.898)	(0.341)
N	2755	3205	2525	14830	995	10140
adj. R-sq	0.100	0.074	0.074	0.015	0.049	0.054

(ii) Linear probability model with dummy variable where 0 is a firm that employs no persons with disabilities at all and 1 is a firm that employs at least one person with a disability

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200	-0.0678	1.000***	-0.871	-0.0189	-0.0152	-0.0316
	(0.155)	(1.58e-11)	(0.720)	(0.0500)	(0.0173)	(0.234)
After the 2015 policy change	0.157*	-2.43e-11	0.0174	0.0668***	0.0433***	-0.00480
	(0.0817)	(4.60e-11)	(0.157)	(0.0177)	(0.00639)	(0.0751)
Firm size between 101 and 200 *	-0.00844	1.95e-11	0.318*	0.0476**	0.0296***	0.113
After the 2015 policy change	(0.0944)	(3.63e-11)	(0.172)	(0.0213)	(0.00731)	(0.0874)
Adjusted regular workers	0.0968	-4.40e-09	-0.457	-0.00341	0.00482***	0.139
	(0.0837)	(7.85e-09)	(0.422)	(0.00531)	(0.00150)	(0.124)
Adjusted regular workers squared	-0.00115	9.16e-11	0.00681	0.0000569	0.000000498	-0.00183
	(0.00101)	(1.63e-10)	(0.00625)	(0.0000376)	(0.00000979)	(0.00151)
Adjusted regular workers cubed	0.00000604	-8.34e-13	-0.0000419	-0.000000171*	-3.45e-08	0.00000999
	(0.00000505)	(1.48e-12)	(0.0000386)	(0.000000102)	(2.36e-08)	(0.00000765)
Adjusted regular workers quartered	-1.13e-08	2.81e-15	9.22e-08	1.48e-10	2.74e-11*	-1.88e-08
	(9.06e-09)	(4.99e-15)	(8.60e-08)	(9.16e-11)	(1.43e-11)	(1.37e-08)
Companies with special subsidiary company	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.412	7.79e-08	11.60	0.506**	0.256***	-3.004
	(2.499)	(0.000000139)	(9.953)	(0.226)	(0.0720)	(3.546)
N	285	15	70	4735	32860	295
adj. R-sq	0.229	1.000	0.691	0.085	0.116	0.182

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200	-0.0635*	0.212***	0.00887	0.0209	-0.0581	0.0493
	(0.0378)	(0.0258)	(0.0236)	(0.0954)	(0.0694)	(0.0569)
After the 2015 policy change	0.0490***	0.0808***	0.0493***	0.0883**	0.0996***	0.0295
	(0.0145)	(0.0166)	(0.00836)	(0.0363)	(0.0327)	(0.0201)
Firm size between 101 and 200 *	0.0772***	0.0206	0.0591***	-0.0164	0.0255	0.0577**
After the 2015 policy change	(0.0181)	(0.0175)	(0.0105)	(0.0377)	(0.0358)	(0.0257)
Adjusted regular workers	-0.0124***	-0.00713	0.00300**	0.00258	-0.0179**	0.00165
	(0.00404)	(0.00642)	(0.00136)	(0.00887)	(0.00836)	(0.00266)
Adjusted regular workers squared	0.000148***	0.0000391	0.00000871	0.0000355	0.000195***	0.0000126
	(0.0000299)	(0.0000626)	(0.00000711)	(0.0000602)	(0.0000661)	(0.0000117)
Adjusted regular workers cubed	-0.000000461***	1.66e-08	-2.57e-08**	-0.000000156	-0.000000659***	-2.38e-08*
	(8.73e-08)	(0.000000245)	(1.19e-08)	(0.000000162)	(0.000000207)	(1.40e-08)
Adjusted regular workers quartered	4.21e-10***	-2.02e-10	7.92e-12**	1.60e-10	6.87e-10***	3.56e-12*
	(8.12e-11)	(3.25e-10)	(3.42e-12)	(1.44e-10)	(2.12e-10)	(2.01e-12)
Companies with special subsidiary company	0	0	0.276***	0	0	444.7*
	(.)	(.)	(0.0732)	(.)	(.)	(229.8)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.590***	0.775***	0.125*	0.0298	0.941***	0.348**
	(0.183)	(0.225)	(0.0739)	(0.414)	(0.343)	(0.152)
N	6170	8475	19730	1350	2025	3505
adj. R-sq	0.241	0.093	0.156	0.269	0.155	0.162

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200	0.0432	-0.0613	0.00333	-0.0218	-0.0437	-0.0159
	(0.0455)	(0.0565)	(0.0539)	(0.0192)	(0.126)	(0.0273)
After the 2015 policy change	0.0601**	0.0561***	0.00244	0.0784***	-0.0181	0.0608***
	(0.0252)	(0.0211)	(0.0271)	(0.0111)	(0.0419)	(0.0127)
Firm size between 101 and 200 *	0.0717**	0.0583**	0.0372	0.0149	0.0733	0.0602***
After the 2015 policy change	(0.0281)	(0.0253)	(0.0325)	(0.0120)	(0.0447)	(0.0148)
Adjusted regular workers	0.00300***	0.0120	-0.000734	0.0145***	-0.0252	0.00417***
	(0.000561)	(0.0128)	(0.0111)	(0.00254)	(0.0617)	(0.00122)
Adjusted regular workers squared	-0.00000239**	-0.0000795	0.0000478	-0.0000720***	0.000372	-0.00000359
	(0.00000113)	(0.000131)	(0.000102)	(0.0000189)	(0.000762)	(0.00000590)
Adjusted regular workers cubed	5.19e-10	0.000000342	-0.000000179	0.000000154***	-0.00000186	-5.41e-09
	(3.17e-10)	(0.000000543)	(0.000000369)	(5.48e-08)	(0.00000392)	(9.77e-09)
Adjusted regular workers quartered	-3.08e-14	-5.68e-10	1.93e-10	-1.15e-10**	3.14e-09	5.20e-12
	(2.06e-14)	(7.78e-10)	(4.45e-10)	(5.08e-11)	(7.17e-09)	(4.84e-12)
Companies with special subsidiary company	0	0	0	0	0	0.0353
	(.)	(.)	(.)	(.)	(.)	(0.136)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.299***	-0.0834	0.316	-0.146	1.011	0.294***
	(0.0721)	(0.438)	(0.416)	(0.110)	(1.762)	(0.0725)
N	2755	3205	2525	14830	995	10140
adj. R-sq	0.178	0.124	0.138	0.119	0.145	0.128

Note 1: Cluster standard errors for each individual firm level are shown in parentheses.
Note 2: ***p<0.01, **p<0.05, *p<0.1.

Note 3: “Firm size between 101 and 200” means the treatment dummy and “After the 2015 policy change” means the dummy variable after the 2015 policy change. “Firm size between 101 and 200 * After the 2015 policy change treatment group” is the intersection term of the variables mentioned earlier.

Table 6 Yearly effects based on 2013

(i) Employment rate of persons with disabilities

	All	Companies that met the legal employment rate before the policy change	Companies that did not meet the legal employment rate before the policy change	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200 * 2014	0.0539***	-0.0466	0.0413***	-0.00268	0.0744***
	(0.0150)	(0.0292)	(0.00903)	(0.0377)	(0.0157)
Firm size between 101 and 200 * 2015	0.128***	0.0556	0.157***	0.0826**	0.144***
	(0.0173)	(0.0339)	(0.0101)	(0.0392)	(0.0190)
Firm size between 101 and 200 * 2016	0.169***	0.108***	0.198***	0.128**	0.180***
	(0.0201)	(0.0394)	(0.0122)	(0.0505)	(0.0208)
Firm size between 101 and 200 * 2017	0.192***	0.167***	0.192***	0.178***	0.194***
	(0.0201)	(0.0385)	(0.0137)	(0.0436)	(0.0226)

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200 * 2014	0.160	0.000598	0.877	0.0641	0.0557***	0.0296
	(0.309)	(.)	(0.509)	(0.0528)	(0.0184)	(0.147)
Firm size between 101 and 200 * 2015	0.109	-0.0173	1.332**	0.0977	0.160***	0.233
	(0.339)	(.)	(0.514)	(0.0668)	(0.0262)	(0.275)
Firm size between 101 and 200 * 2016	0.0374	-0.0332	2.669**	0.0974	0.148***	0.404
	(0.343)	(.)	(0.892)	(0.0782)	(0.0353)	(0.312)
Firm size between 101 and 200 * 2017	-0.0781	-0.0526	1.763*	0.106	0.205***	0.243
	(0.347)	(.)	(0.898)	(0.0889)	(0.0395)	(0.376)

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200 * 2014	0.00850	0.0566	0.0155	0.156**	0.0293	-0.0000579
	(0.0323)	(0.0527)	(0.0210)	(0.0729)	(0.0765)	(0.0567)
Firm size between 101 and 200 * 2015	0.0824**	0.181***	0.120***	0.211**	0.167*	0.0779
	(0.0408)	(0.0651)	(0.0270)	(0.106)	(0.0927)	(0.0776)
Firm size between 101 and 200 * 2016	0.0968*	0.154**	0.142***	0.156	0.219*	0.129
	(0.0510)	(0.0777)	(0.0325)	(0.121)	(0.113)	(0.0947)
Firm size between 101 and 200 * 2017	0.164***	0.110	0.193***	0.183	0.131	0.158
	(0.0552)	(0.0886)	(0.0362)	(0.131)	(0.128)	(0.0990)

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c
Firm size between 101 and 200 * 2014	0.0526	0.170**	0.0303	0.0212	0.113	0.0500
	(0.0609)	(0.0814)	(0.0724)	(0.0747)	(0.110)	(0.0472)
Firm size between 101 and 200 * 2015	0.219**	0.181*	0.101	0.0775	0.168	0.206***
	(0.0902)	(0.0941)	(0.0905)	(0.0755)	(0.123)	(0.0551)
Firm size between 101 and 200 * 2016	0.240**	0.169	0.133	0.0731	0.353**	0.159**
	(0.105)	(0.141)	(0.105)	(0.0784)	(0.165)	(0.0661)
Firm size between 101 and 200 * 2017	0.303**	0.159	0.139	0.143*	0.225	0.133*
	(0.125)	(0.154)	(0.115)	(0.0823)	(0.181)	(0.0714)

(ii) Linear probability model with dummy variable where 0 is a firm that employs no persons with disabilities at all and 1 is a firm that employs at least one person with a disability

	All	Companies that did not meet the legal employment rate before the policy change	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200 * 2014	0.0215***	0.0538***	0.000835	0.0274***
	(0.00315)	(0.00440)	(0.00634)	(0.00362)
Firm size between 101 and 200 * 2015	0.0409***	0.0780***	0.0216***	0.0484***
	(0.00377)	(0.00551)	(0.00728)	(0.00440)
Firm size between 101 and 200 * 2016	0.0449***	0.0720***	0.0190**	0.0551***
	(0.00427)	(0.00620)	(0.00854)	(0.00492)
Firm size between 101 and 200 * 2017	0.0404***	0.0525***	0.0237***	0.0494***
	(0.00442)	(0.00645)	(0.00854)	(0.00517)

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200 * 2014	-0.00412	-6.57e-11	0.556	0.0262	0.0108	0.0365
	(0.104)	(.)	(0.322)	(0.0202)	(0.00704)	(0.0639)
Firm size between 101 and 200 * 2015	-0.00886	1.39e-10	0.566*	0.0520**	0.0320***	0.203**
	(0.127)	(.)	(0.316)	(0.0250)	(0.00878)	(0.0985)
Firm size between 101 and 200 * 2016	-0.0236	3.32e-10	0.651*	0.0612**	0.0330***	0.148
	(0.130)	(.)	(0.330)	(0.0291)	(0.00998)	(0.109)
Firm size between 101 and 200 * 2017	0.00109	6.93e-10	0.547	0.0692**	0.0400***	0.0404
	(0.139)	(.)	(0.355)	(0.0309)	(0.0104)	(0.135)

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200 * 2014	0.0333*	0.000969	0.0175*	0.0408	0.00725	0.0246
	(0.0170)	(0.0172)	(0.00977)	(0.0370)	(0.0345)	(0.0248)
Firm size between 101 and 200 * 2015	0.0831***	0.0473**	0.0572***	0.0150	0.00744	0.0388
	(0.0214)	(0.0206)	(0.0126)	(0.0485)	(0.0449)	(0.0302)
Firm size between 101 and 200 * 2016	0.0890***	0.0191	0.0680***	-0.0229	0.0619	0.0784**
	(0.0252)	(0.0236)	(0.0142)	(0.0546)	(0.0493)	(0.0339)
Firm size between 101 and 200 * 2017	0.110***	-0.00346	0.0785***	0.0199	0.0184	0.0937***
	(0.0265)	(0.0253)	(0.0146)	(0.0556)	(0.0525)	(0.0356)

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200 * 2014	0.0202	0.0144	0.0109	0.00480	0.0521	0.0154
	(0.0267)	(0.0245)	(0.0299)	(0.0116)	(0.0381)	(0.0147)
Firm size between 101 and 200 * 2015	0.0759**	0.0584**	0.0447	0.0228	0.0826	0.0656***
	(0.0350)	(0.0293)	(0.0368)	(0.0145)	(0.0501)	(0.0178)
Firm size between 101 and 200 * 2016	0.0843**	0.0632*	0.0462	0.0178	0.151**	0.0720***
	(0.0389)	(0.0344)	(0.0439)	(0.0164)	(0.0634)	(0.0203)
Firm size between 101 and 200 * 2017	0.0852**	0.0752**	0.0370	0.0112	0.0646	0.0660***
	(0.0398)	(0.0360)	(0.0454)	(0.0166)	(0.0635)	(0.0211)

Note 1: Cluster standard errors for each individual firm level are shown in parentheses.
Note 2: ***p<0.01, **p<0.05, *p<0.1.
Note 3: We estimate the following equation. $y_{it} = \alpha + \gamma Treat_i + \lambda_t + \sum_{\tau=0}^{4} \delta_\tau (Treat_i \cdot \lambda_{t+\tau}) + X'_{it}\beta + \mu_{it}$, where y_{it} is the employment rate of people with disabilities and a dummy variable that uses 0 for firms that employ no persons with disabilities and 1 for firms that employ at least one person with a disability in year t for firm i. $Treat_i$ is a dummy variable that takes the value of 1 for the group of firms with 101 to 200 or fewer employees affected by the 2015 policy change and 0 for the group of fewer than or equal to 100 employees. λ_t is the year dummy with the benchmark year of 2013, and the interaction terms between the treatment dummy and the year dummies denote δ_τ. X'_{it} denotes the control variables. As for the controls, we use a flexible fourth-order polynomial number of adjusted regular workers following Mori and Sakamoto (2018). We also use a dummy for companies with special subsidiaries, year dummies, and prefecture dummies. μ_{it} is the error term. "Firm size between 101 and 200 * 2014" is the intersection term of the treatment dummy and the 2014 dummy, that is, δ_1.

Table 7 Results with 2013 as the baseline for firm size

(i) Employment rate of persons with disabilities

	All	Companies that meet the legal employment rate	Companies that do not meet the legal employment rate	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200	0.261***	0.224***	0.125***	0.214**	0.283***
	(0.0301)	(0.0532)	(0.0128)	(0.0987)	(0.0296)
After the 2015 policy change	0.221***	0.210***	0.323***	0.232***	0.217***
	(0.0126)	(0.0238)	(0.00819)	(0.0302)	(0.0133)
Firm size between 101 and 200 *	0.126***	0.102***	0.156***	0.150***	0.115***
After the 2015 policy change	(0.0128)	(0.0233)	(0.0101)	(0.0322)	(0.0135)
Adjusted regular workers	-0.00197***	-0.00723***	0.00432***	-0.00676	-0.00216***
	(0.000358)	(0.000784)	(0.000200)	(0.00721)	(0.000327)
Adjusted regular workers squared	0.000000727**	0.00000411***	-0.00000259***	0.0000315	0.00000103***
	(0.000000291)	(0.00000103)	(0.000000359)	(0.0000420)	(0.000000198)
Adjusted regular workers cubed	-8.08e-11**	-7.22e-10***	3.82e-10***	-5.01e-08	-1.16e-10***
	(3.78e-11)	(2.44e-10)	(1.05e-10)	(7.58e-08)	(2.49e-11)
Adjusted regular workers quartered	2.38e-15**	3.79e-14**	-1.26e-14***	1.87e-11	3.40e-15***
	(1.16e-15)	(1.49e-14)	(4.17e-15)	(3.80e-11)	(7.60e-16)
Companies with special subsidiary company	6.529***	6.142***	6.404*	10.91***	2.322**
	(1.812)	(1.942)	(3.312)	(2.402)	(0.964)
Year dummy	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes
Constant	1.653***	3.206***	-0.0773***	1.852***	1.657***
	(0.0686)	(0.126)	(0.0206)	(0.340)	(0.0680)
N	244224	118165	126059	62317	181907
adj. R-sq	0.018	0.014	0.153	0.009	0.017

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200	2.941	1.160***	-4.863*	-0.116	0.139	0.462
	(3.122)	(0.00221)	(2.515)	(0.147)	(0.103)	(0.468)
After the 2015 policy change	0.484**	0.00984	-0.913	0.211***	0.112***	0.0242
	(0.194)	(0.00641)	(0.596)	(0.0587)	(0.0232)	(0.198)
Firm size between 101 and 200 *	-0.131	-0.00852	1.547**	0.0538	0.125***	0.310
After the 2015 policy change	(0.247)	(0.00404)	(0.616)	(0.0579)	(0.0282)	(0.274)
Adjusted regular workers	0.177	0.0395	-2.994*	-0.106**	-0.0148	0.278
	(0.423)	(0.705)	(1.525)	(0.0450)	(0.0119)	(0.390)
Adjusted regular workers squared	-0.00203	0.00168	0.0449*	0.00106**	0.0000730	-0.00376
	(0.00454)	(0.0147)	(0.0223)	(0.000455)	(0.0000765)	(0.00490)
Adjusted regular workers cubed	0.00000860	-0.0000398	-0.000282*	-0.00000420**	-0.000000107	0.0000199
	(0.0000190)	(0.000134)	(0.000136)	(0.00000188)	(0.000000177)	(0.0000258)
Adjusted regular workers quartered	-1.23e-08	0.000000214	0.000000641*	5.62e-09**	4.69e-11	-3.59e-08
	(2.72e-08)	(0.000000452)	(0.000000300)	(2.63e-09)	(1.32e-10)	(4.84e-08)
Companies with special subsidiary company	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.013	-2.241	72.97*	5.268***	2.901***	-5.161
	(12.66)	(12.49)	(36.70)	(1.529)	(0.572)	(10.93)
N	285	15	70	4800	32990	285
adj. R-sq	0.077	1.000	0.786	0.074	0.017	0.146

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200	-0.00722	1.546***	0.0893	-0.204	0.0660	0.000179
	(0.0811)	(0.134)	(0.0692)	(0.218)	(0.242)	(0.144)
After the 2015 policy change	0.154***	0.332***	0.130***	0.0387	0.224***	0.0811
	(0.0343)	(0.0523)	(0.0216)	(0.0837)	(0.0858)	(0.0673)
Firm size between 101 and 200 *	0.105***	0.0511	0.133***	0.213**	0.0919	0.158**
After the 2015 policy change	(0.0375)	(0.0584)	(0.0245)	(0.0867)	(0.0879)	(0.0696)
Adjusted regular workers	-0.00981	-0.0941***	0.000705	0.0219	-0.0546*	0.000419
	(0.00866)	(0.0306)	(0.000782)	(0.0220)	(0.0319)	(0.00370)
Adjusted regular workers squared	0.000106*	0.000411	0.000000285	-0.0000673	0.000454*	0.00000386
	(0.0000602)	(0.000287)	(0.000000493)	(0.000143)	(0.000257)	(0.0000119)
Adjusted regular workers cubed	-0.000000331**	-0.000000347	-9.94e-11	1.28e-08	-0.00000145*	-3.29e-09
	(0.000000165)	(0.00000110)	(7.96e-11)	(0.000000362)	(0.000000806)	(1.09e-08)
Adjusted regular workers quartered	3.06e-10**	-5.57e-10	5.87e-15	8.89e-11	1.48e-09*	4.41e-13
	(1.47e-10)	(1.44e-09)	(3.80e-15)	(3.05e-10)	(8.22e-10)	(1.50e-12)
Companies with special subsidiary company	0	0	6.578***	0	0	40.07
	(.)	(.)	(1.195)	(.)	(.)	(154.1)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.002**	6.101***	0.858***	-0.576	2.964**	1.274***
	(0.435)	(1.103)	(0.106)	(1.059)	(1.298)	(0.377)
N	6220	8480	19820	1365	2075	3545
adj. R-sq	0.081	0.137	0.041	0.086	0.036	0.055

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200	0.175	0.534	0.0128	-0.309*	0.501	0.161
	(0.130)	(0.517)	(0.140)	(0.178)	(0.478)	(0.109)
After the 2015 policy change	0.232***	0.184**	0.0121	0.322***	0.0879	0.229***
	(0.0762)	(0.0855)	(0.0728)	(0.0533)	(0.115)	(0.0461)
Firm size between 101 and 200 *	0.261***	0.0473	0.0884	0.0407	0.164	0.0960**
After the 2015 policy change	(0.0810)	(0.0993)	(0.0762)	(0.0575)	(0.123)	(0.0468)
Adjusted regular workers	-0.000994	0.0469	-0.0159	0.00300	0.0429	-0.00397***
	(0.00165)	(0.0443)	(0.0318)	(0.0241)	(0.323)	(0.00135)
Adjusted regular workers squared	0.000000377	-0.000378	0.000173	0.0000796	-0.000982	0.00000660***
	(0.00000214)	(0.000313)	(0.000287)	(0.000167)	(0.00413)	(0.00000223)
Adjusted regular workers cubed	-7.43e-13	0.00000102	-0.000000660	-0.000000414	0.00000701	-3.54e-09***
	(5.54e-10)	(0.000000822)	(0.00000103)	(0.000000445)	(0.0000224)	(1.19e-09)
Adjusted regular workers quartered	-2.43e-15	-8.37e-10	8.33e-10	4.67e-10	-1.61e-08	5.41e-13***
	(3.52e-14)	(6.81e-10)	(1.24e-09)	(3.89e-10)	(4.36e-08)	(1.86e-13)
Companies with special subsidiary company	0	0	0	0	0	4.300***
	(.)	(.)	(.)	(.)	(.)	(1.190)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.219***	2.462	1.546	1.522	1.193	1.901***
	(0.219)	(2.456)	(1.202)	(1.179)	(8.991)	(0.177)
N	2795	3215	2545	15125	980	10285
adj. R-sq	0.101	0.076	0.075	0.015	0.050	0.052

(ii) Linear probability model with dummy variable where 0 is a firm that employs no persons with disabilities at all and 1 is a firm that employs at least one person with a disability

	All	Companies that do **not** meet the legal employment rate	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200	0.109***	0.137***	0.0598***	0.113***
	(0.00538)	(0.00851)	(0.0109)	(0.00626)
After the 2015 policy change	0.0831***	0.143***	0.0837***	0.0810***
	(0.00259)	(0.00369)	(0.00509)	(0.00302)
Firm size between 101 and 200 *	0.0253***	0.0363***	0.0206***	0.0304***
After the 2015 policy change	(0.00305)	(0.00473)	(0.00600)	(0.00356)
Adjusted regular workers	0.00279***	0.00523***	0.00667***	0.00280***
	(0.0000717)	(0.000195)	(0.000604)	(0.0000791)
Adjusted regular workers squared	-0.00000114***	-0.00000349***	-0.0000209***	-0.00000113***
	(0.000000109)	(0.000000450)	(0.00000323)	(0.000000106)
Adjusted regular workers cubed	1.22e-10***	6.20e-10***	2.58e-08***	1.20e-10***
	(1.54e-11)	(1.19e-10)	(5.67e-09)	(1.49e-11)
Adjusted regular workers quartered	-3.49e-15***	-2.17e-14***	-1.06e-11***	-3.43e-15***
	(4.86e-16)	(4.58e-15)	(2.80e-12)	(4.71e-16)
Companies with special subsidiary company	0.0960	0.347	0.266***	0.00246
	(0.107)	(0.448)	(0.0428)	(0.167)
Year dummy	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes
Constant	0.273***	-0.239***	0.105***	0.269***
	(0.00957)	(0.0144)	(0.0325)	(0.00987)
N	244224	126059	62317	181907
adj. R-sq	0.140	0.339	0.109	0.143

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200	-0.220	1.000***	-0.871	-0.0273	0.0123	0.360
	(0.176)	(1.58e-11)	(0.720)	(0.0483)	(0.0170)	(0.220)
After the 2015 policy change	0.185**	-2.43e-11	0.0174	0.0710***	0.0441***	0.00549
	(0.0853)	(4.60e-11)	(0.157)	(0.0183)	(0.00642)	(0.0754)
Firm size between 101 and 200 *	-0.0701	1.95e-11	0.318*	0.0471**	0.0278***	0.143
After the 2015 policy change	(0.0968)	(3.63e-11)	(0.172)	(0.0214)	(0.00731)	(0.0969)
Adjusted regular workers	0.0175	-4.40e-09	-0.457	-0.0203*	0.00500***	0.236
	(0.0473)	(7.85e-09)	(0.422)	(0.0117)	(0.00135)	(0.151)
Adjusted regular workers squared	-0.0000710	9.16e-11	0.00681	0.000253**	-0.00000414	-0.00318*
	(0.000474)	(1.63e-10)	(0.00625)	(0.000120)	(0.0000851)	(0.00189)
Adjusted regular workers cubed	0.000000158	-8.34e-13	-0.0000419	-0.00000107**	-2.11e-08	0.0000173*
	(0.00000192)	(1.48e-12)	(0.0000386)	(0.000000500)	(2.05e-08)	(0.00000988)
Adjusted regular workers quartered	-2.01e-10	2.81e-15	9.22e-08	1.47e-09**	2.78e-11*	-3.27e-08*
	(2.69e-09)	(4.99e-15)	(8.60e-08)	(7.01e-10)	(1.59e-11)	(1.84e-08)
Companies with special subsidiary company	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.402	7.79e-08	11.60	0.997**	0.259***	-5.346
	(1.651)	(0.000000139)	(9.953)	(0.396)	(0.0665)	(4.242)
N	285	15	70	4800	32990	285
adj. R-sq	0.250	1.000	0.691	0.089	0.117	0.208

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200	0.00461	0.222***	0.0435**	-0.0973	-0.0723	0.0358
	(0.0376)	(0.0255)	(0.0198)	(0.0862)	(0.0696)	(0.0542)
After the 2015 policy change	0.0556***	0.0925***	0.0489***	0.0606*	0.120***	0.0321
	(0.0141)	(0.0166)	(0.00835)	(0.0367)	(0.0327)	(0.0198)
Firm size between 101 and 200 *	0.0791***	0.00591	0.0585***	0.0399	-0.0125	0.0601**
After the 2015 policy change	(0.0185)	(0.0176)	(0.0104)	(0.0377)	(0.0353)	(0.0256)
Adjusted regular workers	-0.0134***	-0.00752	0.00397***	0.00924	-0.0149**	0.00551***
	(0.00373)	(0.00623)	(0.000215)	(0.00809)	(0.00757)	(0.00140)
Adjusted regular workers squared	0.000147***	0.0000488	-0.00000214***	-0.00000412	0.000171***	-0.00000803*
	(0.0000272)	(0.0000603)	(0.000000194)	(0.0000525)	(0.0000598)	(0.00000447)
Adjusted regular workers cubed	-0.000000444***	-4.45e-08	3.21e-10***	-6.36e-08	-0.000000576***	3.71e-09
	(7.81e-08)	(0.000000234)	(3.60e-11)	(0.000000133)	(0.000000187)	(4.09e-09)
Adjusted regular workers quartered	4.01e-10***	-1.00e-10	-1.46e-14***	8.71e-11	5.91e-10***	-4.28e-13
	(7.33e-11)	(3.09e-10)	(1.82e-15)	(1.12e-10)	(1.90e-10)	(5.63e-13)
Companies with special subsidiary company	0	0	0.274***	0	0	-23.69
	(.)	(.)	(0.0718)	(.)	(.)	(57.79)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.663***	0.762***	0.103***	-0.258	0.795**	0.166
	(0.175)	(0.220)	(0.0319)	(0.384)	(0.317)	(0.103)
N	6220	8480	19820	1365	2075	3545
adj. R-sq	0.245	0.094	0.157	0.271	0.164	0.166

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200	0.0935**	-0.00929	0.0522	-0.0212	0.0723	0.0446*
	(0.0443)	(0.0544)	(0.0554)	(0.0185)	(0.123)	(0.0237)
After the 2015 policy change	0.0686***	0.0522**	0.0130	0.0797***	-0.0114	0.0666***
	(0.0257)	(0.0210)	(0.0269)	(0.0110)	(0.0422)	(0.0125)
Firm size between 101 and 200 *	0.0542*	0.0741***	0.0196	0.0161	0.0619	0.0437***
After the 2015 policy change	(0.0278)	(0.0259)	(0.0324)	(0.0118)	(0.0455)	(0.0145)
Adjusted regular workers	0.00269***	0.00535	-0.00182	0.0135***	-0.0102	0.00352***
	(0.000514)	(0.00479)	(0.0109)	(0.00179)	(0.0806)	(0.000303)
Adjusted regular workers squared	-0.00000208**	-0.00000790	0.0000508	-0.0000643***	0.000188	-0.00000424***
	(0.000000993)	(0.0000321)	(0.0000985)	(0.0000118)	(0.00105)	(0.000000631)
Adjusted regular workers cubed	4.47e-10	-6.89e-09	-0.000000178	0.000000128***	-0.00000108	1.77e-09***
	(2.76e-10)	(8.21e-08)	(0.000000354)	(2.99e-08)	(0.00000568)	(3.60e-10)
Adjusted regular workers quartered	-2.64e-14	1.56e-11	1.85e-10	-8.97e-11***	2.16e-09	-2.34e-13***
	(1.79e-14)	(6.73e-11)	(4.24e-10)	(2.50e-11)	(1.11e-08)	(5.59e-14)
Companies with special subsidiary company	0	0	0	0	0	0.0858
	(.)	(.)	(.)	(.)	(.)	(0.160)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Prefectural dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.305***	0.133	0.379	-0.113	0.614	0.335***
	(0.0690)	(0.226)	(0.414)	(0.0857)	(2.208)	(0.0398)
N	2795	3215	2545	15125	980	10285
adj. R-sq	0.188	0.121	0.143	0.120	0.143	0.130

(iii) Yearly effect based on 2013: Employment rate of persons with disabilities

	All	Companies that met the legal employment rate before the policy change	Companies that did not meet the legal employment rate before the policy change	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200 * 2014	0.0367***	-0.229***	0.0579***	0.0290	0.0367***
	(0.0122)	(0.0251)	(0.00921)	(0.0339)	(0.0118)
Firm size between 101 and 200 * 2015	0.119***	-0.0506*	0.160***	0.118***	0.117***
	(0.0147)	(0.0282)	(0.0102)	(0.0377)	(0.0153)
Firm size between 101 and 200 * 2016	0.153***	0.00787	0.204***	0.171***	0.141***
	(0.0178)	(0.0331)	(0.0125)	(0.0453)	(0.0184)
Firm size between 101 and 200 * 2017	0.161***	0.0449	0.194***	0.204***	0.142***
	(0.0184)	(0.0338)	(0.0141)	(0.0456)	(0.0199)

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200 * 2014	0.00651	0.000598	0.877	0.0505	0.0695***	0.126
	(0.232)	(.)	(0.509)	(0.0521)	(0.0196)	(0.151)
Firm size between 101 and 200 * 2015	-0.0729	-0.0173	1.332**	0.0886	0.159***	0.291
	(0.287)	(.)	(0.514)	(0.0673)	(0.0283)	(0.284)
Firm size between 101 and 200 * 2016	-0.148	-0.0332	2.669**	0.0835	0.139***	0.465
	(0.345)	(.)	(0.892)	(0.0789)	(0.0373)	(0.329)
Firm size between 101 and 200 * 2017	-0.165	-0.0526	1.763*	0.0651	0.182***	0.364
	(0.404)	(.)	(0.898)	(0.0890)	(0.0411)	(0.384)

	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200 * 2014	0.0116	-0.0309	0.0321	0.208***	0.0274	0.0490
	(0.0326)	(0.0518)	(0.0201)	(0.0777)	(0.0770)	(0.0568)
Firm size between 101 and 200 * 2015	0.0690*	0.0651	0.122***	0.328***	0.139	0.116
	(0.0413)	(0.0653)	(0.0266)	(0.108)	(0.0951)	(0.0759)
Firm size between 101 and 200 * 2016	0.0866*	0.0519	0.140***	0.290**	0.158	0.188**
	(0.0514)	(0.0769)	(0.0321)	(0.121)	(0.115)	(0.0901)
Firm size between 101 and 200 * 2017	0.178***	-0.0105	0.184***	0.332**	0.0166	0.245***
	(0.0557)	(0.0884)	(0.0354)	(0.131)	(0.128)	(0.0944)

(iv) Yearly effect based on 2013: Linear probability model with dummy variable where 0 is a firm that employs no persons with disabilities at all and 1 is a firm that employs at least one person with a disability

	All	Companies that did not meet the legal employment rate before the policy change	Prefectures with a higher rate of filling job vacancies for people with disabilities	Prefectures with a lower rate of filling job vacancies for people with disabilities
Firm size between 101 and 200 * 2014	0.0162***	0.0712***	0.00430	0.0213***
	(0.00306)	(0.00434)	(0.00634)	(0.00350)
Firm size between 101 and 200 * 2015	0.0337***	0.0811***	0.0275***	0.0384***
	(0.00370)	(0.00564)	(0.00731)	(0.00430)
Firm size between 101 and 200 * 2016	0.0353***	0.0771***	0.0190**	0.0444***
	(0.00419)	(0.00645)	(0.00838)	(0.00485)
Firm size between 101 and 200 * 2017	0.0299***	0.0565***	0.0211**	0.0387***
	(0.00435)	(0.00668)	(0.00835)	(0.00512)

	Agriculture and forestry	Fisheries	Mining and quarrying of stone and gravel	Construction	Manufacturing	Electricity, gas, heat supply and water
Firm size between 101 and 200 * 2014	0.0107	-6.57e-11	0.556	0.0302	0.0215***	0.107
	(0.109)	(.)	(0.322)	(0.0203)	(0.00704)	(0.0682)
Firm size between 101 and 200 * 2015	-0.00547	1.39e-10	0.566*	0.0531**	0.0388***	0.267**
	(0.133)	(.)	(0.316)	(0.0253)	(0.00879)	(0.104)
Firm size between 101 and 200 * 2016	-0.102	3.32e-10	0.651*	0.0641**	0.0356***	0.217*
	(0.137)	(.)	(0.330)	(0.0294)	(0.0100)	(0.124)
Firm size between 101 and 200 * 2017	-0.0894	6.93e-10	0.547	0.0700**	0.0414***	0.107
	(0.145)	(.)	(0.355)	(0.0311)	(0.0104)	(0.151)

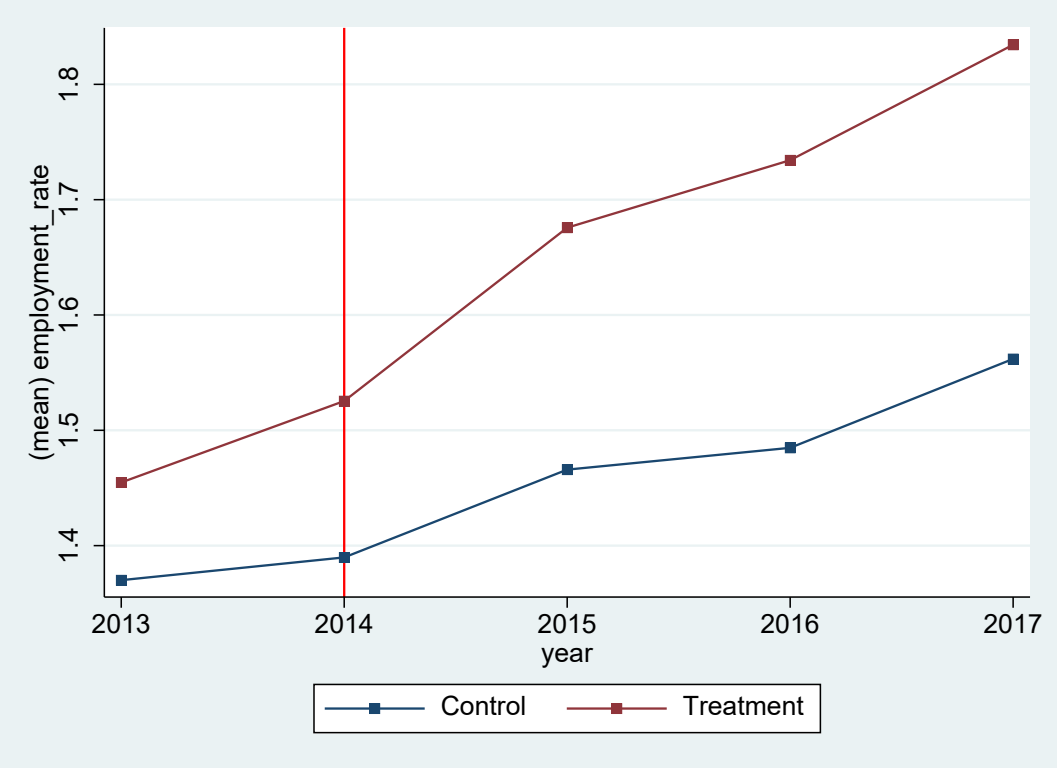
	Information and communications	Transport and postal activities	Wholesale and retail trade	Finance and insurance	Real estate and goods rental and leasing	Scientific research, professional and technical services
Firm size between 101 and 200 * 2014	0.0387**	0.0149	0.0238**	0.0684*	0.00105	0.0381
	(0.0175)	(0.0172)	(0.00978)	(0.0380)	(0.0347)	(0.0247)
Firm size between 101 and 200 * 2015	0.0873***	0.0347*	0.0578***	0.0592	-0.0220	0.0416
	(0.0220)	(0.0209)	(0.0126)	(0.0488)	(0.0453)	(0.0304)
Firm size between 101 and 200 * 2016	0.0887***	0.0151	0.0718***	0.0605	0.0129	0.0919***
	(0.0258)	(0.0237)	(0.0141)	(0.0550)	(0.0495)	(0.0337)
Firm size between 101 and 200 * 2017	0.120***	-0.00989	0.0816***	0.103*	-0.0272	0.105***
	(0.0270)	(0.0254)	(0.0145)	(0.0562)	(0.0527)	(0.0353)

	Accommodations, eating and drinking services	Living-related and personal services and amusement services	Education, learning support	Medical, health care and welfare	Compound services	Services, n.e.c.
Firm size between 101 and 200 * 2014	0.0217	0.0245	0.000402	0.0132	0.0596	0.0290**
	(0.0264)	(0.0244)	(0.0298)	(0.0115)	(0.0380)	(0.0146)
Firm size between 101 and 200 * 2015	0.0551	0.0608**	0.0304	0.0317**	0.0879*	0.0616***
	(0.0347)	(0.0296)	(0.0368)	(0.0144)	(0.0509)	(0.0175)
Firm size between 101 and 200 * 2016	0.0793**	0.0810**	0.0213	0.0238	0.126*	0.0632***
	(0.0387)	(0.0349)	(0.0438)	(0.0163)	(0.0646)	(0.0201)
Firm size between 101 and 200 * 2017	0.0608	0.118***	0.00752	0.0125	0.0613	0.0499**
	(0.0396)	(0.0367)	(0.0456)	(0.0165)	(0.0648)	(0.0208)

Note 1: Cluster standard errors for each individual firm level are shown in parentheses.
Note 2: ***p<0.01, **p<0.05, *p<0.1.
Note 3: We estimate (iii) and (iv) as follows. $y_{it} = \alpha + \gamma Treat_i + \lambda_t + \sum_{\tau=0}^{4} \delta_\tau (Treat_i \cdot \lambda_{t+\tau}) + X'_{it}\beta + \mu_{it}$, where y_{it} is the employment rate of people with disabilities and a dummy variable that uses 0 for firms that employ no persons with disabilities and 1 for firms that employ at least one person with a disability in year t for firm i. $Treat_i$ is a dummy variable that takes the value of 1 for the group of firms with 101 to 200 or fewer employees affected by the 2015 policy change and 0 for the group of fewer than or equal to 100 employees. λ_t is the year dummy with the benchmark year of 2013, and the interaction terms between the treatment dummy and the year dummies denote δ_τ. X'_{it} denotes the control variables. As for the controls, we use a flexible fourth-order polynomial number of adjusted regular workers following Mori and Sakamoto (2018). We also use a dummy for companies with

special subsidiaries, year dummies, and prefecture dummies. μ_{it} is the error term. “Firm size between 101 and 200 * 2014” is the intersection term of the treatment dummy and the 2014 dummy, that is, δ_1.

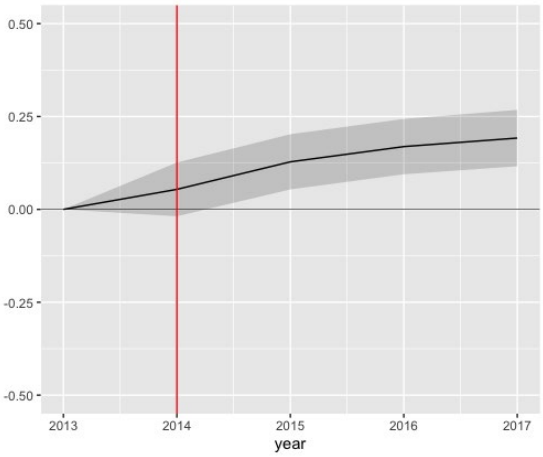
Figure 1 Comparison of trends between treatment and control groups.



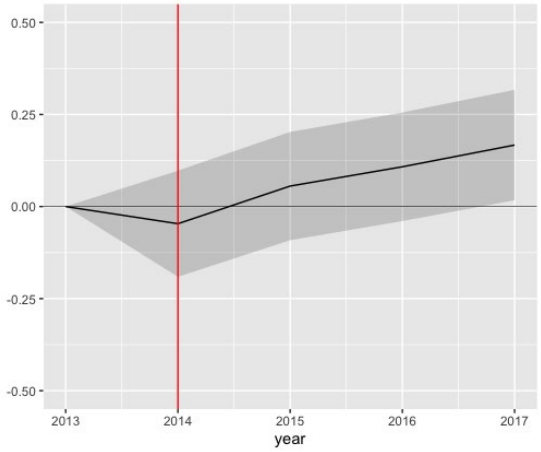
Note 1: The red line indicates the year prior to the policy change in 2015.

Figure 2 Yearly changes in the employment rate of people with disabilities based on 2013.

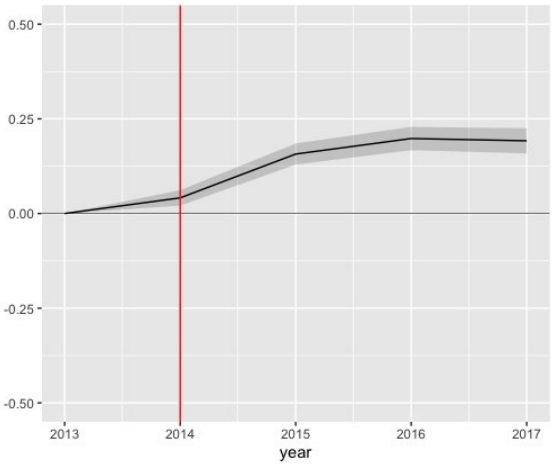
(i) All



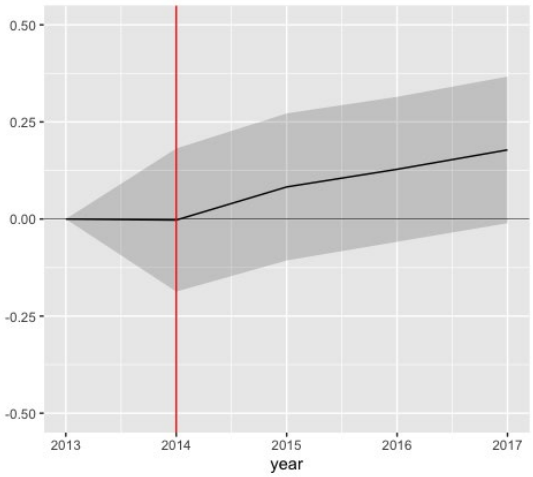
(ii) Companies that meet the legal employment rate



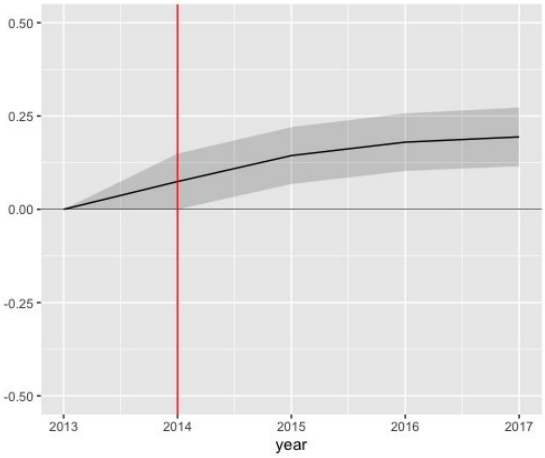
(iii) Companies that do not meet the legal employment rate



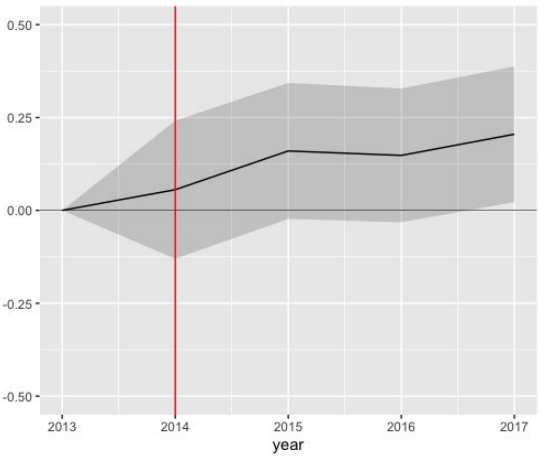
(iv) Prefectures with a higher rate of filling job vacancies for people with disabilities



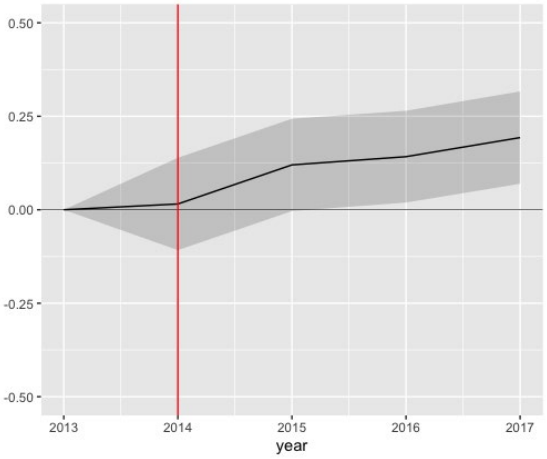
(iv) Prefectures with a lower rate of filling job vacancies for people with disabilities



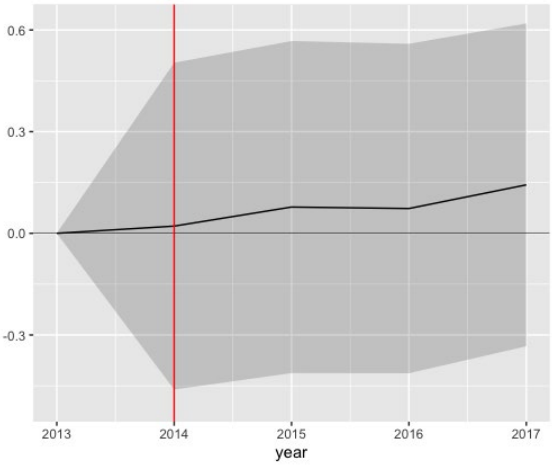
(v) Manufacturing



(vi) Wholesale and retail trade



(vii) Medical, health care, and welfare



Note 1: We estimate the following estimation model. $y_{it} = \alpha + \gamma Treat_i + \lambda_t + \sum_{\tau=0}^{4} \delta_\tau (Treat_i \cdot \lambda_{t+\tau}) + X'_{it}\beta + \mu_{it}$, where y_{it} is the employment rate of people with disabilities and a dummy variable that uses 0 for firms that employ no persons with disabilities and 1 for firms that employ at least one person with a disability in year t for firm i. $Treat_i$ is a dummy variable that takes the value of 1 for the group of firms with 101 to 200 or fewer employees affected by the 2015 policy change and 0 for the group of fewer than or equal to 100 employees. λ_t is the year dummy with the benchmark year of 2013, and the interaction terms between the treatment dummy and the year dummies denote δ_τ. X'_{it} denotes the control variables. As for the controls, we use a flexible fourth-order polynomial number of adjusted regular workers following Mori and Sakamoto (2018). We also use a dummy for companies with special subsidiaries, year dummies, and prefecture dummies. μ_{it} is the error term. "Firm size between 101 and 200 * 2014" is the intersection term of the treatment dummy and the 2014 dummy, that is, δ_1.
Note 2: Hatched areas indicate 95% confidence intervals based on the cluster standard errors for each individual firm level.
Note 3: The red line indicates the year prior to the policy change in 2015.