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Effects of Japanese disability employment policy on shareholder wealth

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Abstract

Japan's disability employment policy, a quota-levy system, aims to equalize the cost sustained by firms that employ persons with disabilities. The penalty under this system is the disclosure of the names of noncompliant firms and their rate of disability employment. Although this system is a type of cap-and-trade system, the government uniformly sets not only the legal employment rate but also the amount of levies and grants. In 2003, a large-scale information disclosure of firms' disability unemployment rate occurred, outside of the regular punitive disclosure process. This study examines the effects of the information disclosure on firms' rate of disability employment by using data from 2003 events that occurred in Tokyo and Osaka. Results indicate that the penalty imposed by the Japanese disability employment policy may be ineffective in promoting the employment of persons with disabilities. Moreover, because the system is inefficient, the costs of employing the disabled persons are not equalized. This factor has resulted in a low level of employment of persons with disabilities. We therefore conclude that the mispricing in the cap-and-trade system may lead to a moral hazard for employers.

Keywords: Disability, Policy Evaluation, Event Study, Cap-and-Trade System

JEL classification numbers: J15, J18, J29, J70, K31

1. Introduction

Most major industrial societies implement a variety of government programs in an attempt to ameliorate the consequences of work-limiting health impairments and disabilities on the earning capacity and economic well-being of their citizens. Such government programs mainly consist of income-support and employment-centered programs. Among these, employment-centered programs play a more central role because realizing the employment of persons with disabilities fosters the ultimate goal of promoting their social participation. In addition, persons with disabilities represent a significant proportion of the working age population in many countries (OECD, 2003). In recent years, because of developments in medical care and rehabilitation technology, disabled persons with the necessary support can be as productive as persons without disabilities. Therefore, in order to effectively promote the employment of disabled persons, countries need an appropriate disability employment policy.

In developed countries, such disability policies mainly consist of antidiscrimination laws and quota-levy systems (OECD, 2003). Antidiscrimination laws require employers to offer reasonable accommodation to disabled employees and ban discrimination in employment. Many Western countries have implemented antidiscrimination laws, and many researchers have analyzed their effects, finding a somewhat negative effect of the employment (Acemoglu and Angrist, 2001; Jones, 2008). However, almost no quantitative studies have examined quota-levy systems.

The Japanese Government employs a quota-levy system that requires firms to employ a fixed percentage of disabled persons. If the firms do not meet the legal employment quotas they must pay levies. If firms meet the legal employment quotas, they receive employment subsidies funded by redistribution of the collected levies. Under this system, the names of companies that consistently fail to meet the legal requirements are published as a method of punishment.

Critics of this system point out that while the primary aim of the system is to equalize the costs associated with employing the disabled for each firm, the optimal number of disabled employees for each firm is heterogeneous. Critics note that imposing a uniform employment rate, whereby each firm employs disabled persons proportionally with their overall number of employees is inefficient, as doing so results in a loss of social welfare (Tsuchihashi and Oyama, 2008). From an economic point of view, this criticism seems reasonable. However, to date, there is no empirical evidence in the literature to support this argument.

The primary innovation of this study is to detect empirically the inefficiency of the quota-levy system. Conventional data on the employment of disabled persons

published in Japan are available as only aggregated data. However, in 2003, an accidental disclosure made data on individual firms' employment of disabled workers available. In this study, we use the event study methodology to investigate investor reactions to the information disclosure and discuss their evaluations regarding whether a employer runs its human resources efficiently under the quota-levy system. This study develops previous studies that have used investor reactions to study human resource management (HRM) and firm performance (Abowd et al., 1990; Hersch, 1991; Abowd, 1989; Dinardo and Hallock, 2002; Arthur and Cook, 2004).

One probable source of bias in estimating the effect of the employment of persons with disabilities on stock price is the likely endogeneity of firm performance with respect to the disability employment. Efficient HRM is likely to raise firm performance. Therefore, disability employment may influence firm performance. However, a firm's performance could be good for other reasons, even if HRM is inefficient. The secondary innovation of this study is the approach used to break the simultaneity between firm performance and HRM. In order to identify the effect of HRM on firm performance we require variables that affect HRM but do not directly impact firm performance. The instruments in this paper are variables on past attributes that are related to HRM but that are not related to the stock price after the information disclosure.

This paper is organized as follows. In Section 2, we explain the Japanese disability employment policy and its economic problems, followed by a description of the information disclosure process. In Section 3, we explain the research hypothesis and design of the analysis. In Section 4, we present the estimation strategy and definition of the variables used in estimations. In Section 5, we provide information regarding data sources, sample selection strategy, and descriptive statistics. In Section 6, we check the validity of the instrumental variables and discuss the implications. In Section 7, we present estimation results and their interpretations. Finally, in Section 8, we give our concluding remarks.

2. Background

2.1. *The Japanese disability employment policy and its economic problems*

The quota-levy system was enacted in 1977. The system requires firms to employ a certain quota of disabled workers based on a constant percentage of regular employees. Companies with 301 or more employees that fail to meet the legal employment quota for disabled employees can be assessed a monthly fine of 50,000 yen for each disabled worker below the quota. The money collected is used primarily to

provide employment subsidies to help companies cover the costs of meeting the legal employment quota for disability employment. Firms with 301 or more employees are given subsidies of 21,000 yen per month for each disabled worker they employ in excess of the legal employment quota, while firms with 300 or fewer employees are awarded subsidies of 27,000 yen for each additional disabled employee beyond the quota amount. When businesses are unable to furnish sufficient reasons for failing to achieve the legal employment quota, they are ordered by the Ministry of Health, Labour, and Welfare to make a "disability employment plan".[1] Furthermore, for companies that continue to fall short of the required level of disability employment, a final measure—public announcement of the company's name—is undertaken.

This system aims to achieve two objectives: (1) to promote the employment and stability of disabled persons and (2) to equalize the costs borne by firms for employing persons with disabilities. These two objectives have a single, inseparable relation; they are not independent aims. The quota-levy system in Japan is concerned with the expenses borne by a company that result from disability employment. In this system, to effectively promote disability employment, the burdens borne by all types of companies must be equalized. However, the levy and subsidy amounts are set uniformly by the government, without acknowledging the real-world heterogeneity in costs across companies.

(Figure 1)

Figure 1 depicts the trend in the percentage of companies out of compliance with the quota since the founding of the system in 1977 to 2002. The dotted line represents the subset of companies with over 1,000 employees. Although the noncompliance rate temporarily rose following increases in the legal employment rate in 1988 and 1998, overall there appears to be a gradual decline in the rate of noncompliance for firms. As of 2002, however, the noncompliance rate remained slightly higher than 70%. The solid line represents wholly private enterprises, for which the ratio of companies failing to achieve the legal employment rate gradually increased over time.

Government statistics show that the unemployment rate of disabled persons with the ability to work is 70.2% (Ministry of Health, Labour, and Welfare, 2003). Therefore, Figure 1 shows an ongoing situation in which disabled persons who are willing and able to work do not find employment, which results from many companies

[1] Entrepreneurs who fail to adopt this plan are assessed a penalty of up to 200,000 yen.

refraining from employing workers with disabilities.

Now let us review the quota-levy system. The system sets the legal employment rate and obliges each company to employ a certain fixed number of disabled workers. The authorities collect levies from companies that do not achieve the legal employment rate and distribute most of the revenue collected to companies that have achieved the target level. This system can be viewed as a type of a cap-and-trade system. However, levy and grant amounts set exogenously are unlikely to equalize company burdens. Because companies are heterogeneous in nature, some enterprises can employ disabled persons with a low burden, whereas others cannot. Therefore, some managers fail to achieve their obligation as a result of the design of the system. Eventually, many firms could refrain from employing persons with disabilities.

To promote the employment of disabled persons, the government in Japan should employ a more efficient cap-and-trade system. It is necessary both to set the legal employment rate of disabled persons in a manner that accounts for the size of the labor force of working-age persons with disabilities who have the ability to work and to create a market for companies' right not to employ disabled individuals. The price determined by competitive equilibrium would become the price of minimizing the cost incurred by all firms in Japan, which would serve to promote disability employment.

2.2. *Process of information disclosure*

In Japan only aggregated macro-level data regarding disability employment is generally available. However, the disability employment situation of individual companies in Tokyo and Osaka was publicly disclosed outside of the regular punitive disclosure process in 2003. Specifically, the disability employment situations, as of 2000, of enterprises under the jurisdiction of the Osaka and Tokyo labor bureaus.

Because the number of disabled workers had been viewed as too low, several non-profit organizations (NPOs) in Tokyo and Osaka went to court hoping to force disclosure of the disability employment situation of individual firms. That legal action resulted in the disability employment situation of the enterprises in these jurisdictions being published in Osaka on September 8, 2003, and in Tokyo on October 8, 2003. The types of the companies on which information was disclosed differed within each bureau. In Osaka, the names of companies with 1,000 or more employees, regardless of achievement of the legal employment rate, were published. In Tokyo, the names of companies that had not achieved the legal employment rate were published. The NPOs that obtained this information published them on their own websites. This publication

was the first such large-scale disclosure of disability employment information in Japan.[2]

3. Research hypothesis and design of the analysis

3.1. *Research hypothesis: Expected factors in investor reaction*

Using the disclosed information, we can predict three factors that affect investor expectations. The first factor is the expense burden borne by the company to comply with disability employment law. Whether the firm fulfills its obligatory legal rate of disability employment depends on its management's opinion of the firm's employment obligation and the penalty associated with publicly announcing the company's name for noncompliance. Under the Japanese quota-levy system, it is very unlikely that company burdens are equal. Therefore, companies that incur excessive expenses for employing disabled persons tend not to achieve the legal employment rate and instead pay the levy. However, if there is a company with the same characteristics whose management considers disability employment as a duty, then that company will likely incur the cost rather than pay the levy, even if the levy is cheaper. Conversely, a company that does not need to expend many resources to employ disabled persons can easily achieve the legal employment rate and receive subsidies. If the latter type of company does not achieve legal employment quotas, they are regarded as having an inefficient employment strategy and could potentially generate higher profits.

The second factor concerns investors' discrimination against disabled persons. If investors believe that every person with a disability has low productivity, the stock prices of the enterprises employing a significant number of disabled persons may fall (Wolfers, 2006).

The third factor is related to how investors evaluate a company's corporate social responsibility (CSR). In 2003, only a small number of investors considered disability employment to be an element of CSR in Japan. Moreover, socially responsible investment in Japan was negatively evaluated (Jin et al., 2006). This suggests that investors do not use disability employment to evaluate firms' CSR. Thus, we focus on the first and second possibilities.

3.2. *Design of the analysis*

We divide the sample companies into two groups: those that met the legal employment quotas for disabled persons and those that failed to do so. Then, we estimate the change in normal stock prices before the information disclosure, and

[2] From 1977 to 2003, the names of only four companies were announced, all of which were small businesses.

inspect the differences in the stock price changes for both groups after the information disclosure.

At this stage, it is necessary to note an endogeneity problem. Since the attributes of companies and their managers are heterogeneous, different companies incur different costs for employing disabled persons. In addition, some managers comply with legal obligations while others do not. If firm characteristics such as these influence corporate performance such as whether legal employment quotas are reached, investor's decisions will be endogenous given the variability in corporate performance. Therefore, we need instrumental variables that have a high probability of affecting a firm's disability employment, but are unlikely to influence investors' decision-making. To determine whether firms with each attribute employ economically efficient employment strategies and to confirm the validity of the instrumental variables, we investigate the relationship between each firm's level of disability employment and its profits for the year 2000, when the disclosure information was collected.

Next, to examine whether investor discrimination exists, we analyze excess long-term returns from the information disclosure. Since stock prices are influenced by various factors, the possibility of a short-term change is anomalous (Gompers et al., 2003). Therefore, it is necessary to check whether the efficient market hypothesis holds. If investors are convinced that every disabled worker has low productivity, the information disclosure would lead to a short-term decline in the stock prices of firms that employ a significant number of disabled persons. However, such firms are expected to show higher long-term returns despite the negative short-term stock price reaction.[3]

3.3. *Relationship between excess short-term and long-term returns*

We examine the relationship between excess short-term and long-term returns. Figure 3 shows the excess return transition in the form of a solid line arrow. On the day of the event (S), the information reached the public. At that time, there were three possibilities regarding the transition of an excess short-term return from T_0 to T_1: it will rise, fall, or remain constant. Let us consider the first two possibilities. After a rise (or fall) in excess short-term returns, if the information exerts no long-term influence, the transition of the excess long-term return becomes constant; that is, the efficient market hypothesis holds (E1), (E2). In the event of an anomaly, the transition of the

[3] This test was already performed in the context of sexism. Wolfers (2006) referred to the discrimination awareness that exists in society as "mistake-based discrimination" and analyzed whether this discrimination awareness is reflected in the stock price data.

excess return should rise (fall) in the short term and then fall (rise) in the long term, which is depicted by the dotted lines (mistake-based discrimination (M)).

(Figure 2)

4. The impact of disability employment information: Estimation strategy and definition of the variables

4.1. *Estimation strategy*

We use the following estimation models to analyze stock price reactions to the information disclosure:

$$CAR_i(BHAR_i) \quad _0 \quad _1 D_i \quad \mathbf{X}_i \boldsymbol{\beta}_j \quad _i \tag{1}$$

CAR (*BHAR*) expresses the cumulative abnormal short- and long-term returns that are subsequently defined. *D* is a dummy variable that indicates whether the firm achieved the legal employment rate, which takes the value of 1 if the firm achieves the legal employment level and 0 if it does not. is the error term and ***X*** is the control variable matrix, which is unrelated to the information disclosure but affects the changes in stock price.

$_1$ indicates the impact on stock prices: it shows the differences in the impact between the average (cumulative) abnormal return of the underachieving companies and that of the achieving companies. Using this formulation, we can eliminate the macro shock experienced by the entire sample and measure the pure effect of the event.

The variable *D* might have endogeneity because it allows us to consider two possibilities by which the information disclosure influences a firm's stock prices. The first is that information disclosure regarding the disability employment situation directly influences the decision of the investor. The second is that some company attributes that strongly relate to employment of persons with disabilities also affect corporate performance, which is reflected in stock prices. When *D* in equation (1) has endogeneity, if we estimate (1) using ordinary least squares (OLS), $_1$ does not satisfy the consistency requirement. Therefore, it is necessary to employ two-stage least squares (TSLS) estimation. In the first step, we use X and the instrumental variable ***Z***, which influences disability employment, but not investors' decision-making. These variables are assumed to be independent, and we estimate the following reduced form by OLS:

$$D_i \quad {}_0 \quad \mathbf{Z}_i\boldsymbol{\alpha}_j \quad \mathbf{X}_i\boldsymbol{\alpha}_k \quad u_i \tag{2}$$

To control for the influence of the scale of each stock in the stock market and of any industry-related event unrelated to the information disclosure, we use *industrial dummy* variables and *market capitalization* at the end of June 2003 as short-term control variables, and *industrial dummy* variables and the mean value of *market capitalization* from June 2003 to June 2004 as long-term control variables. In addition, the long-term dependent variable, explained in the following section, does not consider the individual stock attributes of the information disclosure at that point in time. Therefore, we used the *profit rate* (*ordinary profits* ÷ *total assets*) for 2003 as a long-term control variable. In the following subsection, we define the dependent variables.

4.2. *Definition of the dependent variables*

4.2.1. *Short-term analysis*

In the short-term analysis, we use the *Cumulative Abnormal Return* (*CAR*) as a dependent variable and derive it using event study methodology.[4] The event study method, pioneered by Fama et al. (1969), measures the rate of change in stock prices resulting from the occurrence of an event compared with the expected rate of change had the event not occurred. It is a technique for testing the impact of the event by analyzing the deviation from the normal movement.[5]

First, we define the event in which we are interested. In general, the investor does not necessarily know about the event on the very day of its occurrence; even if the investor is rational, it takes some time for information to spread. In this case, the event day should be extended by several days to the day on which stock prices indicate an influence from the event. The period after which it is predicted that the event will influence stock prices is called an event period or event window (L_2).

(Figure 2)

CAR is calculated as described below. Using the overall risk in a market

[4] This methodology is frequently used in corporate decision-making policy (Kothari and Warner 2007).

[5] This explanation is based on Mackinlay (1997) and Farber and Hallock (1999).

portfolio (the rate of return of the Tokyo Stock Price Index (TOPIX) in this article), let *t* indicate time in trading days, let *s* indicate the event date, and let *i* indicate firms.

First, the firm's daily return, R_i is regressed on R_m, the market's daily return on day *t*, as shown in the market model below:

$$R_i \quad _i \quad _i R_m \quad _i \tag{3}$$

This equation is estimated for the period from day s–240 to day s–5. This period during which stock prices are unaffected by the event is called the estimation period (L_1). Next, for the days around the event date, we calculate abnormal returns in the following way:

$$AR_i \quad R_i \quad (\hat{} _i \quad \hat{} _i R_m) , \tag{4}$$

where $\hat{}_i$ and $\hat{}$ are estimated regression coefficients from equation (3). Assuming $T_1 \quad _1 \quad _2 \quad T_2$ in Figure 2, the accumulated value of abnormal returns between $_1$ and $_2$, or *CAR*, is obtained:

$$CAR_i(\ , \ )_2 \qquad \sum_{1}^{2} AR_i \tag{5}$$

4.2.2. *Setting the estimation and event periods*

Several drawbacks of the event study method have been pointed out. First, investors' expectations based on information on the event may not be the same (Card and Krueger, 1997).[6] In this case, the stock price reaction will differ based on corporate attributes. Second, it is difficult to capture the timing of the event. If information regarding the event is already well known, investors' expectations will already be reflected in the stock prices. In this case, it becomes impossible to identify whether the

[6] Card and Krueger (1997) analyzed the impact of the revision of the Minimum Wages Act on stock prices after a newspaper article containing that information was published (the event). However, they could not obtain a consistent enough interpretation to detect a possible impact. They pointed out that this was because investors had different expectations from the company with respect to stock prices, even though raising minimum wages influenced company profits.

detected influence is the result of the event.

We dealt with the above problem as follows. First, we divided the sample into groups according to employee scale, industry, and regional attributes, and by using the window after the event (L_3), we checked whether the impact from the disclosure of the information on stock prices continued.[7] By doing so, we could verify whether investors had equal expectations for each group. Second, the event day was set as September 22, 2003, for Osaka, and October 22, 2003, for Tokyo. Then, we selected six estimation periods (30, 60, 90, 120, 240, and 247 days) and five event periods (1, 3, 5, 11, and 21 days). On the basis of the results obtained from this variety of estimation and event periods, we identified the respective estimation and event periods during which this typical pattern appeared. Through this procedure, we arrived at the short-term dependent variable, *CAR*, by using an event period of 11 days and an estimation period of 240 days.

4.2.3. *Long-term analysis*

For the long-term analysis, we used the Buy-and-Hold Abnormal Return (*BHAR*). If R_i represents firm *i*'s daily return on day *t*, and R_m represents the market portfolio's daily return on day *t,* then BHAR can be determined as follows:[8]

$$BHAR_i \qquad {}_1^T(1 \quad R_i) \qquad {}_1^T(1 \quad R_m) \tag{7}$$

We selected two periods during which the short-term impact of the event is assumed to have disappeared—from 30 days to 1 year after the event and from 30 days to 2 years after the event.

4.3. *Selection of the instrumental variables*

The attributes of a company and its HRM are certain to have a strong influence on whether that company meets employment quotas for disabled persons. Therefore, these factors strongly correlate with *D* in estimation models (1) and (2). These are predetermined variables that have been decided upon before the information disclosure and, therefore, cannot be regarded as determinant factors of the stock price change from the information disclosure. Therefore, they become candidates for the instrumental variables $\mathbf{Z}$.

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[7] We selected an 11-day window from day +1 to day +11 from the event.

[8] The proxy variable of the market portfolio is the Tokyo Stock Price Index (Topix).

One potential candidate for the instrumental variable is a firm's number of employees. Since the quota-levy system is a type of quota system, the firm is expected to employ a fixed percentage of disabled persons. However, the legal employment rate rarely corresponds with the optimum number of disabled employees for a firm. Because the quota-levy system was designed in such a way that burdens differ depending on employee scale, whether the legal employment rate of disabled persons is achieved will strongly depend on a firm's employee scale.[9]

The year a company was established also influences its compliance with disability employment standards. Because the issue of disability employment attracts considerable social interest, it is very likely that the employment of disabled persons in private firms has been strongly influenced by social trends. For instance, when the quota-levy system began in Japan, newspapers constantly focused on and criticized the banking industry's non-compliance with the legal employment rate requirement, although achieving the legal employment rate of 1.5% at that time was believed to be difficult.[10, 11] In addition, each time a large enterprises achieved the legal employment rate during the first half of the 1980s, it was a noted in the news media.[12] These points

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[9] The levy duty is imposed on companies with 301 or more employees. However, the quota duty is imposed on companies with 56 or more employees.

[10] An editorial titled "Acceptance of handicapped persons in companies" was published on October 31, 1977, in the *Mainichi Shimbun*, a well-known daily newspaper in Japan. Another article was published in this newspaper dated November 1, 1977. This article introduced the quota-levy system in a tone that suggested it is the company's duty to employ the disabled.

[11] We can regard this criticism as apply to all regulated industry in the country. Under the system, it was expected that achieving the legal employment rate would be difficult. Documents from the time of the system's establishment indicate that a governmental body was proposed to take the lead in achieving the required rate of employment, along with obtaining civilians' consent (Tezuka 1999).

[12] One of the most widely read Japanese daily newspapers, the *Asahi Shimbun*, published an article on March 30, 1981, that praised Fujitsu's achievement in meeting the legal employment rate and its positive step of offering incentives for employing the disabled. Another Japanese daily newspaper, the *Yomiuri Shimbun*, printed an article on June 5, 1981, regarding Nissan meeting the disabled person employment rate of 1.5%, a first for the automobile industry. On June 11, 1981, the *Asahi Shimbun* reported Fuji Bank's achievement of a disabled employment rate of 1.53%, when the legal

suggest that corporate activity directed toward disability employment is strongly influenced by social trends. If support for disability employment had existed when old enterprises were established, these companies would have had more incentive to employ disabled persons. Moreover, such companies would also have had adequate know-how regarding employment of the disabled.

The HRM of a firm influences its employment patterns. Rapid aging of the employee population is a concern for many large Japanese companies. Among full-time workers in companies with more than 1,000 employees, the percentage of employees who are 45 years of age or older has risen rapidly from 31% in 1990 to 36% in 1998 (Genta, 2001). It is common knowledge that most of the disabled employees in a private enterprise become disabled during their time of employment, so we use average yearly income and average age as variables to represent the HRM of the company (Tezuka, 1999).

When the rational expectations of the semi-strong efficient market hypothesis hold, past public information does not influence stock prices. Therefore, these instrumental variables are based entirely on the data collected from individual companies in 2000, when the disclosure information was collected.

5. Data, sample selection, and descriptive statistics

The attributes of the firms affected by the information disclosure differ between Osaka and Tokyo. The NPO in Osaka announced the names of 290 enterprises with 1,000 or more employees (hereafter referred to as “large firms”) that the Osaka Bureau of Labor made public. The NPO in Tokyo printed the names of 9,012 enterprises made public by the Tokyo Bureau of Labor that had not achieved the legal employment rate. We used data on firms in Tokyo that achieved the legal employment rate. These are enterprises with headquarters in Tokyo, whose annual financial statements were submitted, and whose names were not published on the homepage of the NPO in Tokyo. Since the names of only large firms were released to the public in Osaka, Tokyo firms were divided into firms with less than 999 employees (hereinafter referred to as “small- and medium-sized firms”) and large firms. Our sample consists of firms with stock traded on the first section of the Tokyo Stock Exchange. Other data used in this study include information for the year 2000 collected from the “Corporate Financial Databank” compiled by the Nikkei Economic Electronic Databank System (NEEDS). Stock prices and market capitalization data were obtained from NEEDS-Financial QUEST (Nikkei

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employment rate for financial institutions was only 1.5%.

Digital Media, Inc.), while financial data were obtained from the Corporate Financial Databank and the Kaisha Shikiho [Quarterly Corporate Report].

According to the Survey on the Actual Employment Status of Persons with Physical Disabilities and Persons with Intellectual Disabilities (Ministry of Health, Labour, and Welfare, 2003), 71.1% of disabled workers are employed in non-manufacturing industries and 28.9% are employed in manufacturing industries. This uneven distribution indicates that the corporate burden resulting from the employment of disabled persons differs greatly between the two types of industries. Therefore, the following analysis is divided on the basis of employee scale, district, and type of industry.

Table 1 lists the selected enterprises based on type of industry and employee scale. This table indicates that, with respect to the distribution of industries, the ratio of non-manufacturing firms that achieved the legal employment rate was greater. This is because non-manufacturing firms included industries in which it is easier to employ disabled persons, such as service, wholesale, and retail industries. The samples used here do not differ greatly from similar data sets from across Japan.

(Table 1)

Table 2 present descriptive statistics. This table contains the respective values of CAR, 2 years of BHAR, and the variance estimate of CAR are presented.

(Table 2)

6. Cross-sectional relationship of disability employment and company profits in 2000

6.1. *Methodology*

Because we have to check the validity of using an instrumental variable, we examine the relationship between the employment of disabled persons and company profits at the time of data collection pertaining to the disclosure. We employed the market test estimation method developed by Hellerstein et al. (2002) to test the short-term implications of the employer discrimination hypothesis proposed by Becker (1972). This model confirms that employee attribute (race, sex, etc.) ratios and company profits are not correlated if the company in question pays wages to their employees in accordance with their productivity. In this study, we used the following estimation model employed by Sano (2005) and Kawaguchi (2007), who verified the employer sex

discrimination hypothesis by using the market test in Japan.

$$profit_i \quad _0 \quad _1 \frac{D}{L} \quad _2 capital_i \quad _3 Debt_i \quad _4 age \quad \underline{firm_i \quad _5 age} \quad labor_i \quad _6 d\_industry_i \quad _i \tag{8}$$

The dependent variable $profit_i$ is a proxy variable for profitability, defined as operating income/total sales, which is essentially the price-cost margin. Operating income does not correspond to economic profits without subtracting the opportunity cost of capital. The discrepancy between operating income and economic profits depends on each firm's amount of capital. To deal with this issue, we included the ratio of fixed assets to total sales in the regression, denoted as $Capital$. The variable D/L is the proportion of disabled employees to all employees. Debt ratio ($Debt$) is used to control the impact of debt on profits during a negative shock in the market. The variable age_firm indicates the firm's age. Because older firms tend to hold obsolete capital, their assets/total sales ratio may not reflect the real value of capital efficiency. Further, because older firms may also hold a significant amount of intangible capital, such as advanced research, development know-how, or an established brand name, it is important to control for this variable. The variable $d\_industry$ represents industry dummies. Moreover, average employee age is used as a control for firm attributes. OLS is used as the estimation method, and we assumed the heterogeneity of the error term using the method explained by White (1980).

6.2. *Disability employment and firm profit in 2000*

Table 3 shows the results of estimation model (8). Because only the names of large firms were released to the public in Osaka, the results for Tokyo firms were divided into those for firms with 999 or fewer employees (hereinafter referred to as small- and medium-sized firms) and those for large firms. Note that in Tokyo, only the names of the enterprises that failed to achieve the legal employment rate were made public. In Table 2, columns (1), (2), and (3) show the results for manufacturing firms, while columns (4), (5), and (6) show results for non-manufacturing firms. Of these, columns (1) and (4) pertain to small- and medium-sized firms in Tokyo, columns (2) and (5) show data regarding large firms in Tokyo, and columns (3) and (6) pertain to firms in Osaka. Moreover, the results of the enterprises that achieved, and of those that did not achieve, the legal employment rates in Osaka are depicted in columns (7) and (8), respectively.

In columns (7) and (8), both groups show negative but insignificant effects. The results in columns (3) and (6) are similar. Although the detection power may have been relatively poor given the small number of samples from Osaka, the data suggest that firms, both those that meet the legal rate and those that do not, choose their optimal employment strategy. If investors agree that the employment strategy of a firm is correct, the estimation model may not detect the influence of the information disclosure on stock prices.

From the Tokyo samples, it is evident that underachievement of the legal employment rate with respect to disability employment does not influence the profits of large manufacturing firms. Therefore, we assume that this group performs the optimal employment strategy by not achieving the legal employment rate. However, for firms in Tokyo, because there is a positive effect in the case of large firms and a negative effect in the case of small- and medium-sized firms, the cost of disability employment appears to differ depending on employee scale. Moreover, these results indicate that the optimum number of disabled employees most likely differs for manufacturing and non-manufacturing businesses.

On the basis of the analysis in this section, we can confirm that employment of persons with disabilities relates to company profits for some groups.[13] Although firms' corporate performance, which investors regard as an index for trading equities, is not always the same, there is a high possibility that it is linked to company profits. Therefore, we need to perform instrumental variable estimations. Moreover, although the results in this section can neither be used to eliminate the fixed effects nor make the causal relationship specific, the lack of a correlation between profits and disability employment suggests the possibility that each group in Osaka managed to utilize its optimal employment strategy. In addition, there is the possibility that a burden is imposed by higher costs when the legal employment rate is achieved, as the ratio of disabled employees does not correlate with profits for underachieving large manufacturing enterprises in Tokyo. However, with small- and medium-sized manufacturing and non-manufacturing enterprises in Tokyo, underachievement with respect to the legal employment rate reveals the possibility that such firms do not utilize

[13] When we checked the correlation between ordinary profits and the proportion of disabled employees, we found a significant positive relationship in large businesses in Tokyo and a significant negative relationship in Osaka companies that achieved the legal employment rate. Therefore, the correlation is robust, indicating that in some groups, disability employment is correlated with a firm's performance.

an optimal employment strategy.

(Table 3)

7. Estimation Results

7.1. *Short-term results*

In the event study methodology, the estimated variance value at the estimation period is used to verify statistically whether the value of *CAR* is 0. Therefore, to estimate model (1) in which short-term *CAR* is set as a dependent variable, we must determine its variance (Mckenzie and McAleer 1998). To do this, we performed a weighted least squares (WLS) estimation in which the standard deviation of *CAR* during the estimation period was used as the weight.

(Table 4)

Table 4 show the results for manufacturing and non-manufacturing businesses obtained by assuming the short-term *CAR* as a dependent variable. Columns (1), (2), (7), and (8) show the estimation results for small- and medium-sized firms in Tokyo, columns (3), (4), (9), and (10) show these results for large firms in Tokyo, and columns (5), (6), (11), and (12) show the results for large firms in Osaka. Moreover, odd-numbered columns show the results of the WLS estimates that control for the corporate scale in the stock market as well as the industry, while even-numbered columns show the results of the TSLS estimates, which take into consideration factors that may influence achievement of the legal employment rate.

In the table, we reported the findings of the following tests: (i) the Durbin-Wu-Hausman test, which determines whether legal employment rate achievement is really an endogenous variable in relation to the stock price reaction; (ii) the over-identifying restrictions test, which determines whether any of the instrumental variables are correlated with the error term; and (iii) the first-stage F-test, which determines whether the instrumental variables affect the endogenous variable.[14] In this

[14] The over-identifying restrictions test is usually called Sargan's test. However, we used the Hansen J test in the long-term analysis because we used White's method (1980) for dealing with heterogeneity. For more information regarding the similarities between the two tests, see Hayashi (2000).

study, we conclude that the instrumental variable is valid if all of the tests clear it.[15] And we present the marginal effects of the probit estimation results and their significance with respect to estimation model (2) to examine the influence of corporate attributes on the likelihood of endogeneity bias in the table.

First, we describe the results for manufacturing firms. While columns (1), (3), and (5) show the results of only the control variables, columns (2), (4), and (6) show the results after adding the instrumental variables. In small- and medium-sized enterprises in Tokyo, firms with few employees tend to achieve the legal employment rate. With regard to the large firms in Tokyo, because the coefficient of the average annual salary is significantly negative, it is evident that the firms that achieve the legal employment rate offer lower wages. In contrast, firms in Osaka with a large numbers of employees are achieving the legal employment rate. Furthermore, the significant positive effect for years operating indicates that large enterprises that have long addressed the issue of disability employment are achieving the legal employment rate.

The instrumental variables are valid only for Tokyo, not for Osaka. Therefore,

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15 The validity of the instrumental variable that cleared these tests is high; however, the possibility of weak instruments is present (Staigner and Stock, 1997). Therefore, we performed a limited information maximum likelihood (LIML) estimation for the group, wherein the instrumental variables were not valid, along with the conditional likelihood ratio test (Andrews et al., 2006; Moreira, 2003). As a result, in the short term, the coefficient estimation for large-scale manufacturing industries in Tokyo was −0.1704 and the p-value was 0.0310. In the long term, the coefficient estimation for large-scale manufacturing industries in Tokyo was −0.3382 and the p-value was 0.4157. However, in the short term, the coefficient estimation for small-scale manufacturing industries in Tokyo was −0.0576 and the p-value was 0.1776.

Consequently, we only estimated the employee scales showing a stable relationship with the endogenous variable as the instrumental variable. The coefficient was −0.2156 and the p-value was 0.000. In this way, we obtained the same results presented in this study. In this instance, the first-stage F-value was 30.64.

Based on the Stock and Yogo (2005) test, the critical value was 16.38 when the TSLS bias of the confidence interval was less than 10%. Using this information, we confirmed that the instrumental variable has a high enough reliability. From the above data, we ascertained that the presence of weak instruments would not hamper this estimation; however, we should be cautious while supposing the validity of the four instrumental variables regarding the medium- and small-scale businesses in Tokyo.

judging from columns (2) and (4) for Tokyo and column (5) for Osaka, all groups show a significant negative effect.

Next, we describe the results for non-manufacturing firms. Columns (7), (9), and (11) show the results of only the control variables, columns (8), (10), and (12) show the results after adding the instrumental variables. While small- and medium-sized firms in Tokyo have fewer employees, the average age of the employees is higher. Moreover, a new firm at its establishment tends to achieve the legal employment rate. In addition, because the average age of employees is higher, this group possibly contains many disabled employees who became disabled while working. However, the attributes of such firms are the least influential compared with the other groups.

Now let us determine the influence of stock prices. Because the instrumental variables are invalid for these groups, we used the results of the WLS estimates that control for industry as well as corporate scale in the stock market. For small- and medium-sized firms in Tokyo, there is a significant negative effect; however, for large firms in Tokyo, there was a significant positive effect, while for Osaka, there was no effect.

7.2. *Long-term results*

Table 5 shows the estimation results for manufacturing and non-manufacturing firms obtained using the 2-year *BHAR* as the dependent variable.[16] Odd-numbered columns show the results of the OLS estimation that assumes heterogeneity in the error term and controls for industry and corporate scale in the stock market. [17] While even-numbered columns show the result of the TSLS estimate, which take into consideration factors that may influence achievement of the legal employment rate.

(Table 5)

As the instrumental variables are valid only for large-scale manufacturing firms in Tokyo, the other groups are judged on the basis of the OLS estimation results. The table shows that information disclosure regarding the disability employment situation does not influence a firm's equity value in the long run. Column (3) shows that for large-scale manufacturing firms in Tokyo, achieving the legal employment rate has a

[16] The results for the long-term impact after 1 year were similar to the results after two years.

[17] For the OLS estimation, we use the method suggested by White (1980).

considerable influence on a firm's long-term equity value; however, the influence is lost when the endogeneity bias is considered (see column (4)).

7.3. *Summary and interpretation*

First, let us review the short-term results. In the manufacturing sector, there are significant negative differences between the stock prices of firms that do not employ the legally required number of disabled employees and those of firms that employ the legally required number of disabled employees. A similar difference was detected for small- and medium-sized non-manufacturing enterprises in Tokyo. However, in large-scale non-manufacturing enterprises in Tokyo, there is a significant positive difference between the two above-mentioned types of firms.

No long-term influence is seen in any of the groups. The data reveal no evidence of an anomaly based on investors' belief that disabled persons have low productivity. Therefore, the short-term results pertaining to the disability employment situation reflect the true value of the firm. With respect to short-term changes, a negative impact was detected in some groups, which indicates that the regulatory penalty mandated in Japan's disability employment policy of publicly announcing an underachieving company's name may be ineffective—in fact, the disclosure of such information may increase stock prices.

In small- and medium-sized firms in the manufacturing sector, investors judged businesses on the basis of whether they employed more disabled persons than is legally required and whether the firm required considerable expenditures to do so. This was consistent with the estimation results from Section 6—if a large firm does not achieve the legal employment rate, its profits do not correlate with the proportion of disabled employees. In other words, such firms have efficient human resource management.

Although it has been decided to abolish the provision, the disability employment measures contain exclusion rate regulations that reduce the legal employment rate for businesses that cannot easily employ disabled persons. Because many manufacturing businesses must conform to such regulations, it is clear that employing disabled persons involves higher costs for such businesses compared to non-manufacturing businesses. When firm have a small number of employees and pay low wages, disabled persons can be employed at a lower cost. These factors strongly influence stock price reactions, indicating whether achievement of the legal employment rate was good for the firm. This interpretation is also justified by the presence of an excessive bias in the estimated value.

For firms that achieved the legal employment rate in Osaka, the employee scale

was large and firms had been operating for many years. It has been pointed out that such firms possess sufficient knowledge of employing persons with disabilities. Moreover, economies of scale apply to these firms. As discussed in Section 6, the coefficient of this group was negative but not significant. The lack of significance may have resulted from the fact that the estimation model cannot control for the fixed effects of this group of firms. Moreover, detection power was low because of the small number of firms in the samples from Osaka. However, the coefficient was negative and these results were also consistent with the estimation results from Section 6.

The positive effect detected in large enterprises based in Tokyo could have been a result of the optimum number of disabled employees in this type of business exceeding the legal employment rate. Investors likely understood the information concerning underachievement of the legal employment rate to mean that the optimum number of disabled employees was not achieved or that the firm failed to perform profit maximization. Until now, a substantial number of persons with disabilities are employed in non-manufacturing businesses, including in many regulated industries. In the banking industry considerable opportunity exists for the employment of disabled persons through social criticism. Moreover, many such businesses, although private at present, were formerly managed by the government. Because the legal employment rate in government organizations is higher than that in private enterprises, formerly government-managed private companies employ many disabled persons already. Such companies do not incur the initial setup costs necessary for employing persons with disabilities, and they are sure to have sufficient know-how regarding disability employment. Thus, we expect that investors already recognize that smoothly functioning regulated industries and formerly government-managed companies already employ substantial numbers of disabled workers. Moreover, the investors tend to believe that profit maximization involves employing the optimum number of disabled employees in excess of the legal employment rate.

8. Conclusion and remarks

The main objectives of the Japanese quota-levy system are to promote disability employment by equalizing the costs companies face in accommodating disability employment. The estimation results have three main implications. First, we cannot deny that the penalties in the current regulations may be ineffective because, for some companies, it provides new information that may increase their stock price. Second, the manufacturing industry, as well as medium- and small-sized businesses, face prohibitively expensive burdens to disability employment, and therefore, fail to

reach the legal employment quotas. Third, the costs associated with achieving the disability employment rate are not equal for manufacturing and non-manufacturing industries.

These implications show the inefficiency of the quota-levy system and, because of this inefficiency, the system cannot equalize the opportunity cost for firms to employ disabled persons. Therefore, firms with high opportunity costs are have greater difficulty employing persons with disabilities, which is not alleviated by the system. At the same time, the penalties in the system are ineffective because managers are not incentivized to employ the disabled. Moreover, managers in firms with low opportunity costs who employ disabled workers will also not try to employ them. We can posit that this is the main reason why the employment level of the disabled in Japan has been too low. This indicates that the mispricing in the cap-and-trade system may lead to a moral hazard for employers.

In Japan, the problems faced by disabled persons have increased with the abolition of the Law for Supporting the Independence of Persons with Disabilities. To ensure that disabled persons lead an independent life, authorities need to promote the employment of persons with disabilities. For this reason, it is necessary to amend the present quota-levy system. One economically viable solution is to correct mispricing in the cap-and-trade system.

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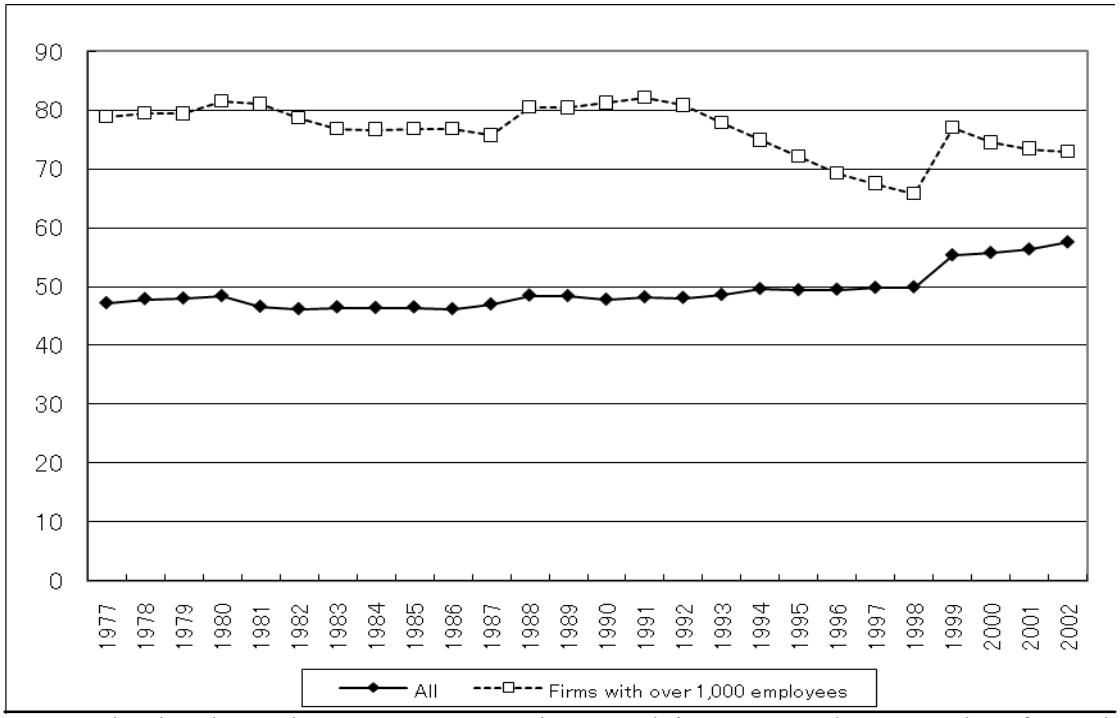
Figure 1. Change in the percentage of companies that do not achieve the legal employment rate from 1977 to 2002.



Note: The legal employment rate was increased in 1988 and 1998. Therefore, the noncompliance rate temporarily increased in those years.
Source: "Current state of employment of physically handicapped and mentally deficient persons," Ministry of Health, Labour, and Welfare.

Figure 2. Conceptual chart of the trend in expected excess returns after information disclosure.

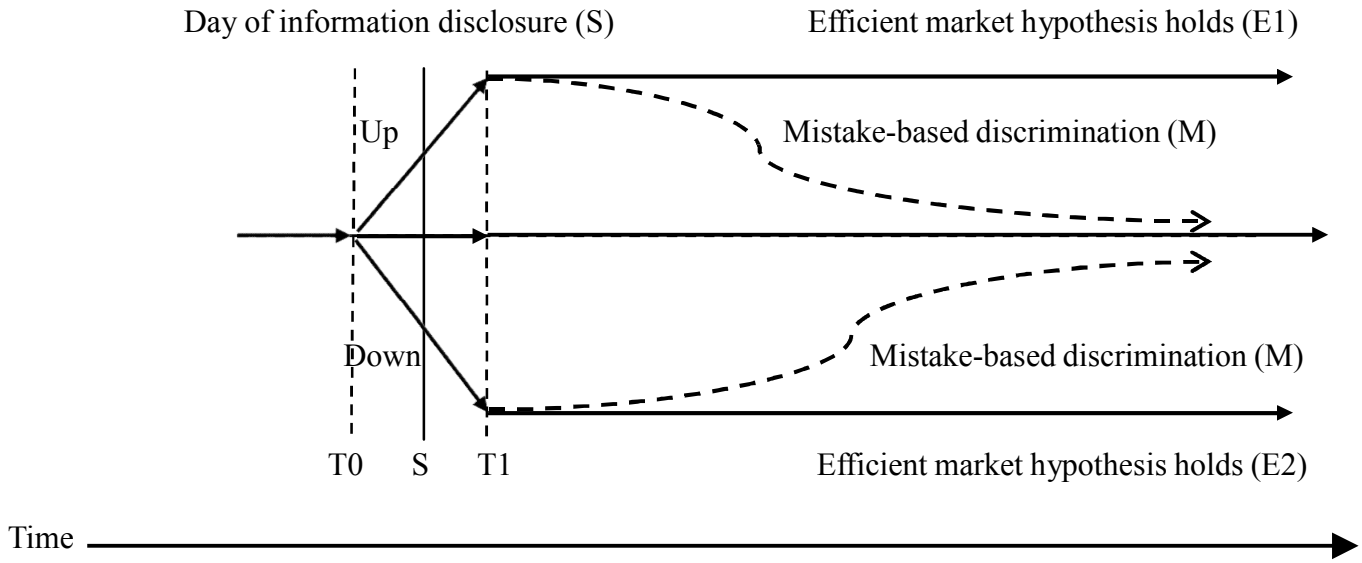


Figure 3. Conceptual chart of the event study method.

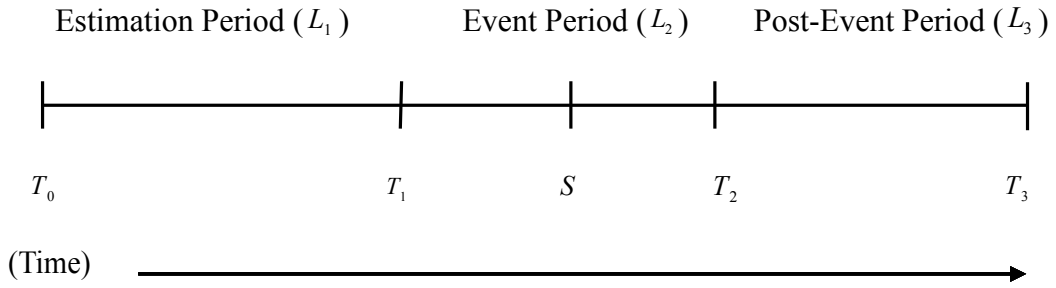


Table 1. Industries to which sample firms belong (firms listed in the first section of the Tokyo Stock Exchange)

Manufacturing					Non-manufacturing				
	Tokyo		Osaka			Tokyo		Osaka	
Industry	Not achieved	Achieved	Not achieved	Achieved	*Industry*	Not achieved	Achieved	Not achieved	Achieved
Foods	19(6)	10 (7)	4	4	*Fishery, Agriculture, & Forestry*	3(1)	0	0	0
Nonferrous Metals	12(0)	1(3)	0	1					
Rubber Products	0(0)	2(1)	1	0	*Mining*	2(1)	0(2)	0	0
Other Products	12(3)	3(7)	4	1	*Construction*	41(7)	10(7)	4	7
Pulp and Paper	5(0)	1(3)	2	0	*Electric Power & Gas*	1(0)	1	0	2
Pharmaceuticals	15(4)	1(1)	4	5	*Transportation & Warehouses*	10(5)	8(10)	1	4
Chemicals	28(20)	9(7)	7	6	*Information & Communication*	26(13)	10(6)	3	0
Oil & Coal Products	2(3)	1(1)	0	0	*Wholesale Trade*	18(36)	5(21)	5	2
Transport Equipment	9(0)	8(0)	4	1	*Retail Trade*	16(14)	9(8)	8	2
Machinery	18(15)	5(9)	5	4	*Banks & Insurance*	13(8)	14(12)	2	1
Textile & Apparels	7(8)	1(6)	6	3	*Real Estate*	5(13)	1(10)	0	0
Metal Products	4(4)	2(6)	0	0	*Services*	13(10)	5(8)	1	1
Glass & Ceramic	6(3)	1(2)	0	0	*All non-manufacturing*	153(108)	63(84)	24	19
Precision	8(5)	2(2)	1	0	*Total*	345(195)	129(158)	69	51
Iron & Steel	5(1)	2(8)	2	1					
Electric Appliances	42(15)	17(11)	5	6					
All manufacturing	192(87)	66(74)	45	32					

Notes: Sample firms with 999 or fewer employees are in parentheses. All firms based in Osaka employed 1, 000 or more people.

Table 2. Descriptive statistics

	Manufacturing											
	Tokyo small and medium				Tokyo large				Osaka			
Variables	Mean	Std.dev.	Min	Max	Mean	Std.dev.	Min	Max	Mean	Std.dev.	Min	Max
Operating income/sales (%)	0.054	0.071	–0.109	0.358	0.044	0.053	–0.106	0.311	0.061	0.078	–0.0056	0.472
Proportion of disability employment	0.010	0.004	0.000	0.017	0.013	0.003	0.003	0.018	0.016	0.004	0.008	0.027
Fixed assets/total sales	0.202	0.158	0.029	0.946	0.151	0.078	0.022	0.456	0.162	0.108	0.004	0.540
Debt/total sales	0.679	0.353	0.147	1.603	0.708	0.322	0.207	1.837	0.658	0.339	0.131	1.986
Age of the firm	63	15	30	101	65	17	10	123	70	21	3	116
Average age of employees	38.9	3.1	30.9	46.7	39.2	2.5	30.1	44.2	38.9	2.6	29.8	44.5
CAR	0.003	0.071	–0.219	0.238	0.023	0.090	–0.589	0.370	–0.051	0.093	–0.325	0.282
Variance estimate	0.001	0.001	0.000	0.013	0.001	0.001	0.000	0.005	0.001	0.001	0.000	0.006
LEA dummy	0.460	0.500	0	1	0.256	0.437	0	1	0.416	0.496	0	1
Market capitalization1	23.662	0.927	21.797	27.080	25.315	1.370	22.665	29.278	25.488	1.302	23.120	29.002
Number of employees	6.028	0.935	1.792	6.903	7.996	0.868	6.909	10.994	7.987	0.851	6.916	10.819
Average yearly income	6.319	0.191	5.788	6.958	6.414	0.176	5.770	6.926	6.421	0.197	5.876	6.886
Average employee age	3.662	0.086	3.431	3.924	3.663	0.072	3.405	3.882	3.660	0.069	3.395	3.796
Age of the firm	4.089	0.298	3.219	4.754	4.115	0.311	2.197	4.804	4.161	0.496	0.693	4.745
BHAR	0.364	0.673	–0.7394	2.731	0.115	0.549	–0.9504	2.899	0.192	0.443	–0.6824	1.682
Market capitalization2	23.792	0.904	21.894	27.246	25.470	1.348	22.864	29.306	25.637	1.288	23.290	29.042
Profit rate in 2003	0.021	0.134	–1.5417	0.167	0.032	0.041	–0.0970	0.257	0.045	0.041	–0.0111	0.183
	Non-manufacturing											
Operating income/sales (%)	0.066	0.063	–0.055	0.294	0.069	0.082	–0.040	0.518	0.051	0.048	–0.006	0.170

Table 2. (Continued) Descriptive statistics

Proportion of disability employment	0.007	0.005	0.000	0.017	0.012	0.003	0.003	0.017	0.017	0.004	0.009	0.025
Fixed assets/total sales	0.153	0.180	0.005	1.236	0.137	0.141	0.012	0.904	0.131	0.131	0.006	0.658
Debt/total sales	3.802	30.197	0.080	308.624	1.151	2.198	0.133	21.138	0.871	0.952	0.200	4.188
Age of the firm	48	21	15	108	54	23	13	135	57	23	17	107
Average age of employees	35.6	4.3	25.6	44.6	37.2	4.3	25.4	49.6	36.6	4.0	28.1	45.5
CAR	–0.006	0.087	–0.332	0.476	–0.012	0.073	–0.300	0.278	–0.009	0.099	–0.394	0.323
Variance estimate	0.001	0.001	0.000	0.007	0.001	0.004	0.000	0.057	0.001	0.001	0.000	0.004
LEA dummy	0.438	0.497	0	1	0.292	0.456	0	1	0.442	0.503	0	1
Market capitalization1	23.909	1.256	21.686	28.728	25.037	1.492	22.373	30.200	24.969	1.315	23.009	28.232
Number of employees	5.793	0.851	1.609	6.899	7.919	0.800	6.909	11.514	8.075	0.949	6.925	10.478
Average yearly income	6.345	0.387	3.243	8.497	6.427	0.353	3.456	7.291	6.371	0.274	5.696	6.936
Average employee age	3.581	0.125	3.243	3.813	3.609	0.112	3.235	3.904	3.595	0.109	3.336	3.818
Age of the firm	3.697	0.669	0.000	4.779	3.853	0.548	0.000	4.898	3.972	0.448	2.773	4.663
BHAR	0.352	0.734	–1.224	2.970	0.263	0.621	–0.886	2.970	0.186	0.471	–0.625	1.489
Market capitalization2	24.095	1.231	22.090	28.758	25.263	1.500	22.322	30.066	25.094	1.317	23.158	28.256
Profit rate in 2003	0.046	0.054	–0.087	0.257	0.040	0.048	–0.048	0.268	0.031	0.029	–0.015	0.130

Notes: LEA indicates the legal employment rate achievement. We used log-values for all variables except the CAR, the variance estimate, the LEA dummy, and the BHAR. Moreover, we conducted the BHAR after processing abnormal values. Here abnormal values refer to data that deviated from the mean by more than four times the SD. Market capitalization1 indicates the market capitalization at the end of June 2003, while Market capitalization2 indicates the mean of the market capitalization from the end of June 2003 to June 2004. The unit for the average yearly income, Market capitalization1, and Market capitalization2 is 1,000,000 yen.

Table 3. Relationship between profits and rate of employment of disabled individuals within firms

	Manufacturing			Non-manufacturing			Osaka	
Variables	Tokyo small and medium	Tokyo large	Osaka	Tokyo small and medium	Tokyo large	Osaka	Achieved	Not achieved
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proportion of disability	−3.1478*	0.9566	−3.4877	−2.6309**	4.7936**	−2.5005	−1.3607	−2.3049
	(1.7447)	(1.3465)	(2.1016)	(1.2575)	(2.2370)	(1.8376)	(1.8345)	(2.8395)
Fixed assets/total sales	−0.0870	0.0733	0.1664	0.0327	0.0356	0.0703	−0.0059	0.1579
	(0.0551)	(0.0706)	(0.1115)	(0.0608)	(0.0739)	(0.1019)	(0.0951)	(0.1011)
Debt/total sales	−0.0824***	−0.0477***	−0.0294	0.0004	−0.0079	0.0207*	0.0344***	−0.0024
	(0.0247)	(0.0138)	(0.0228)	0.0002**	(0.0059)	(0.0103)	(0.0093)	(0.0186)
Age of the firm	−0.0003	−0.0002	0.00001	−0.0004	−0.0009***	−0.0001	−0.00001	0.0004
	(0.0004)	(0.0002)	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0003)	(0.0005)
Average age of employees	−0.0101***	−0.0032**	−0.0083*	−0.0050**	−0.0026	−0.0011	−0.0017	−0.0087**
	(0.0036)	(0.0013)	(0.0045)	(0.0022)	(0.0017)	(0.0012)	(0.0025)	(0.0040)
Legal employment rate			0.0120			0.0073		
Achievement dummy			(0.0150)			(0.0123)		
Constant	0.5891***	0.1720***	0.4288**	0.2590***	0.1622**	0.1395**	0.1131	0.3608**
	(0.1535)	(0.0552)	(0.1962)	(0.0739)	(0.0731)	(0.0676)	(0.0875)	(0.1403)
Number of observations	86	190	76	104	144	41	49	68
R-squared	0.4434	0.3937	0.4716	0.3850	0.4311	0.7726	0.6955	0.4894

Notes: SEs are in parentheses under the regression coefficients. OLS SEs are robust SEs. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, for the two-sided test. The industry dummies are included in all estimation models. “Tokyo small and medium” indicates the group of firms based in Tokyo with 999 or fewer employees, “Tokyo large” indicates the group of firms based in Tokyo with 1,000 or more employees, and “Osaka” indicates the group of firms based in Osaka with 1,000 or more employees.

Table 4. Estimation results for the short-term analysis

	Manufacturing						Non-manufacturing					
	Tokyo small & medium		Tokyo large		Osaka		Tokyo small & medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	WLS	TSLS	WLS	TSLS	WLS	TSLS	WLS	TSLS	WLS	TSLS	WLS	TSLS
LEA dummy	−0.026	−0.208***	0.001	−0.326***	−0.063*	−0.018	−0.025*	−0.031	0.034*	0.259**	−0.042	−0.180
	(0.017)	(0.052)	(0.016)	(0.127)	(0.037)	(0.062)	(0.014)	(0.034)	(0.018)	(0.105)	(0.076)	(0.212)
Market Cap.1	0.024**	0.024**	0.006	0.016*	−0.009	−0.018	0.006	0.006	−0.005	−0.020*	−0.015	−0.010
	(0.009)	(0.012)	(0.005)	(0.009)	(0.015)	(0.017)	(0.006)	(0.006)	(0.006)	(0.010)	(0.032)	(0.031)
DWH		26.98***		18.94***		0.783		0.028		8.665***		0.524
Sargan statistic		Yes		Yes		Yes		No		No		No
First-stage f		7.61***		2.52**		7.00***		8.19***		2.56**		0.96
(Dependent variable D)	Probit estimates marginal effect											
Full-time employees		−0.21***		−0.105**		0.381**		−0.191***		0.021		−0.159
		(0.062)		(0.052)		(0.182)		(0.058)		(0.051)		(0.211)
Average yearly income		0.463		−0.627***		1.452		−0.025		−0.047		0.674
		(0.290)		(0.209)		(0.889)		(0.122)		(0.125)		(0.567)
Average employee age		0.874		0.270		0.117		0.916*		0.353		−0.265
		(0.779)		(0.439)		(1.497)		(0.481)		(0.410)		(1.348)
Age of the firm		−0.147		0.026		0.837**		−0.203**		0.353		0.037
		(0.185)		(0.094)		(0.360)		(0.103)		(0.410)		(0.275)
Number of Obs.	161	161	258	258	77	77	192	192	216	216	43	43

Notes: SEs are in parentheses under the regression coefficients. ***, **, and * denote significance at 1%, 5%, and 10%, respectively for the two-sided test. *LEA* indicates the legal employment rate achievement, and *Market Cap.1* indicates market capitalization1. The industry dummies are included in all estimation models. Regarding the first-stage F-statistic, the coefficient of all instrumental variables shows the value of the null hypothesis of 0 with estimation model (2). DWH indicates the Durbin-Wu-Hausman test, and the Sargan statistic shows the over-identifying restrictions test results. For coping with the weak instruments, see footnote 15. The independent variables used in the probit estimation are expressed using their logarithmic values. And the market capitalization1 and the industry dummies are included in the all probit estimation model.

Table 5. Estimation results for the long-term analysis

	Tokyo small and medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)
			Manufacturing			
LEA dummy	0.133	0.163	0.236***	−0.163	0.117	0.492
	(0.113)	(0.335)	(0.089)	(0.339)	(0.126)	(0.365)
Profit rate in 2003	−0.338*	−0.329	−1.241*	−1.226*	−0.478	0.625
	(0.203)	(0.213)	(0.702)	(0.723)	(1.768)	(2.174)
Market Cap.2	−0.182***	−0.182	−0.109***	−0.092***	−0.116**	−0.215**
	(0.051)	(0.048)	(0.003)	(0.032)	(0.049)	(0.091)
DWH		0.028		4.419**		1.853
Hansen J statistic First-stage f		Yes 3.14**		Yes 3.29**		Yes 4.25***
Number of observations	156	156	246	246	73	73
	(7)	(8)	(9)	(10)	(11)	(12)
			Non-manufacturing			
LEA dummy	−0.100	0.239	0.043	1.793	−0.141	−0.729
	(0.105)	(0.355)	(0.093)	(1.835)	(0.175)	(0.654)
Profit rate in 2003	−3.004***	−2.773***	−1.575**	−2.785	−3.626	−6.191
	(1.048)	(1.003)	(0.751)	(2.095)	(3.565)	(4.604)
Market Cap.2	−0.123**	−0.144***	−0.092***	−0.127**	−0.038	0.022
	(0.048)	(0.047)	(0.029)	(0.062)	(0.051)	(0.083)
DWH		0.167		4.789**		0.963
Hansen J statistic First-stage f		Yes 6.43***		Yes 0.32		No 0.45
Number of observations	184	184	197	197	41	41

Notes: SEs are in parentheses under the regression coefficients. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively, for the two-sided test. *LEA* indicates the legal employment rate achievement, and *Market Cap.2* indicates market capitalization2. The industry dummies are included in all estimation models. Regarding the first-stage F-statistic, the coefficient of all instrumental variables shows the value of the null hypothesis of 0 with estimation model (2). DWH indicates the Durbin-Wu-Hausman test, and the Hansen J statistic shows the over-identifying restrictions test results. *LEA* indicates the legal employment rate achievement. For more on the method for coping with weak instruments, see footnote 14, 15.