The Effects of the Japanese disability employment policy on shareholder wealth[1]

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Abstract

The Japanese disability employment policy, referred to as a quota-levy system, aims to equalize the costs associated with disability employment for each firm. This study attempts to analyze the ramifications of information disclosure regarding each firm's rate of disability employment by using data from an event that took place in Tokyo and Osaka in 2003.

Using the event study methodology, we verified the difference between the stock price changes observed in two groups after information disclosure: one group comprised firms that employ fewer disabled employees than legally required and the other of firms that satisfy the standards set by the instrumental variable (IV) estimation. In addition, we verified whether the efficient market hypothesis holds with respect to information disclosure. Finally, we estimated the cross-sectional relationship between the proportion of disabled employees and each firm's profit in 2000, when the information was collected.

The estimation results indicate the following: First, the penalty imposed by the Japanese disability employment policies—the public disclosure of the firm names—might not be effective in promoting disability employment. Second, among small, medium-sized firms and manufacturing firms, the proportion of disabled employees required by law may exceed their optimal levels. Third, there has been no cost equalization in manufacturing and non-manufacturing firms for employing the disabled. Therefore, a more inclusive policy assessment of disability employment policies, particularly with regard to cost equalization, is required.

JEL classification numbers: J14, J29, J70, K31

Keywords: Disability, Event Study, Instrumental Variable, Policy Evaluation

1 Introduction

This study aims to discuss the cost inequalities caused by the Japanese quota system that accompanies an incomplete subsidy system (quota-levy system).[2]

The quota-levy system in Japan requires firms to employ a fixed number of disabled persons, and the government collects levies from firms that do not achieve the legal disability employment rate. These levies primarily contribute to employment grants to aid the firms that achieve the legal disability employment rate.[3] Under this system, firms that perpetually fail to follow the above measures are penalized with the public announcement of their names.

The primary aim of this system is to equalize the costs associated with employing the disabled in each firm. However, the optimal number of disabled employees is heterogeneous for each firm. Therefore, imposing a uniform employment rate whereby each firm employs disabled persons in proportion to the total number of its employees is not efficient because it wastes resources and generates a loss of social welfare. To minimize social costs, it appears preferable that firms with low opportunity costs in employing the disabled should employ more disabled persons, and those with high opportunity costs should employ fewer disabled persons (Tsuchihashi and Oyama, 2008). Under this system, firms with high opportunity costs incur greater burden to achieve the legal disability employment rate. However, if the penalty incurred is not effective, there will inevitably be certain firms that may flout this legal requirement. Furthermore, if the number of such firms increases, the legal disability employment rate will not be achieved.

In Japan, only the aggregated macro data on disability employment has conventionally been published. However, in 2003, an event occurred that saw the release of individual firm data on disability employment. The purpose of this study is to analyze how firm-level characteristics affected investor reactions to the information disclosure and discuss the following two questions: First, whether the penalty of the quota-levy system is effective. Second, whether the quota-levy system has equalized the costs associated with disability employment for each firm. This study focuses on the evaluation of investors as to whether firms implement their human resource management efficiently under the quota-levy system.

Stock price is used in the study of human resource management and firm performance (Abowd et al., 1990; Hersch, 1991; Abowd, 1989; Dinardo and Hallock, 2002; Arthur and Cook, 2004). And, in the field of Law and Economics, the use of event study methodology to study reactions to the effect of a law that seems profitable for the firm is well established (Besanko et al.,2001). This study aims to contribute to these literatures. We analyze the effects of information disclosure regarding each

[2] The quota-levy system is an old system, and many countries have adopted this system. However, depending on the cultural context of each country, the form of system and the nature of levies are different for different countries. Note that this study solely focuses on the system practiced in Japan.

[3] The levies also provide the necessary rehabilitation and so on for general employment of disabled persons. (For the definition of the term “general employment,” see footnote 31).

firm's disability employment on shareholder wealth and find that investors expect inefficiency caused by the quota-levy system.

The information released will affect investor expectations differently, according to whether or not the firms they are interested in have achieved the legal disability employment rate. In this study, we test the difference between stock price changes of the firms employing fewer disabled employees than legally required and those satisfying the standards set, before and after the event.[4] At this stage, it is necessary to note an endogeneity problem due to a variable related to corporate performance. We use firm characteristics as an instrumental variable (IV), which is highly likely to affect the disability employment status but not likely to influence investor decisions. To confirm the validity of the instrumental variable, we investigated the relationship between each firm's level of disability employment and profit in 2000, when the information was collected. Moreover, we verified that the efficient market hypothesis holds and there are no stock market anomalies after the information is disclosed.

The results are as follows. First, in terms of investor response to disability employment, there is no significant difference between the above two groups of firms regarding the excess return on long-term stock prices. Second, among the small and medium firms, as well as manufacturing firms, there is a significant negative difference between those two groups of firms with regard to the excess return on short-term stock prices. Third, among the large-scale non-manufacturing firms in Tokyo, there is a significant positive difference between the two groups of firms with regard to the excess return on short-term stock prices. Fourth, these results are consistent with the cross-sectional relationship between the proportion of the disabled employed and the profit for each firm in 2000, when the information was collected.

These results indicate the following. First, it is evident that the threat of penal regulations has been ineffective. Second, in the manufacturing industry and small- and medium-sized firms, the number of disabled employees required to achieve the legal disability employment rate may exceed the optimum level for such firms. Third, the expense burden of firms employing the disabled is not equal for manufacturing and non-manufacturing firms. Hence, there is a pressing need for a comprehensive disability employment policy that provides specifications regarding the expense burden that accompanies disability employment.

This paper is structured as follows. Section 2 discusses the Japanese disability employment policy and its economic problems, as well as the information disclosure process. Section 3 explains the design of the analysis and investor reactions. Section 4 presents the estimation strategy used to check the validity of the instrumental variables. Data sources are provided in Section 5 and the interpretation of the estimation results are presented in Section 6. Section 7 presents concluding

[4] Hereafter when we discuss stock price changes, positive (negative) difference indicate that the stock price of the firms employing fewer disabled employees than legally required fall (rise), and on the other hand, that of the firms employing disabled employees satisfying the standards set rise (fall).

remarks.

2. The Japanese disability employment policy and information disclosure

2.1. The Japanese disability employment policy and its economic problems

The quota-levy system was enforced in the Japanese disability employment policy in 1977. This system obliges firms to employ a quota of disabled persons at a constant rate of regular employees. Under the policy, in the case of companies with over 301 employees that fail to meet the legal disability employment rate, the authorities can levy a fine of 50,000 yen per shortfall in disability employment. The money collected is pooled into a rehabilitation foundation, which is primarily used to provide employment grants to support disability employment and help companies achieve the legal disability employment rate. Grants are awarded to firms that employ disabled persons above the legal rate. Firms with over 301 employees are provided grants amounting to 21,000 yen per excess number of disabled workers and firms with less than 300 employees are awarded grants of 27,000 yen per excess number.[5] When firms are unable to furnish sufficient reasons for not achieving this legal rate, they are required to adopt the Disability Employment Plan, as suggested by the Ministry of Health, Labor, and Welfare. Firms that fail to adopt this plan are imposed a penalty of up to 200,000 yen. Furthermore, for companies that continue to fall short of the required level of disability employment, the ultimate penal regulations measure—public announcement of the company's name—is carried out.[6]

This system aims at achieving two objectives. The first is to promote the employment and stability of disabled persons, while the second is to equalize and balance the burden borne by firms as a result of employing disabled persons.[7] These two objectives have a single, indivisible relation; they are not independent aims. They convey that "the employment of disabled persons, as compared to that of nondisabled persons, requires the firm to incur additional expenditure on plant and equipment investment. Therefore, if an individual company bears these expenses, its financial burden will be excessive, which will result in an imbalance. Therefore, to promote disability employment in Japan, all firms need to share the expenses."[8]

The quota-levy system in Japan is concerned with the expenses borne by a company due to

[5] Both are the available figures for 2007. However, they scarcely differ from the figures for 2000.
[6] Article 47 on the Law for the Employment Promotion, etc., of the Disabled.
[7] For details on quota-levy system adopted by other countries, see Thornton (1998).
[8] "The 'levy and grant system for employing physically disabled persons' is intended to improve the general level of their employment, by collecting levies from those firms failing to achieve the employment quota, and offering grants to those firms employing many physically disabled persons … Because the employment of physically disabled and mentally retarded persons imposes a costly financial burden, such as expenses related to modifying working conditions and equipment, special employment management and so on, an imbalance exists between firms that observe their employment obligation and those that do not. The levy and grant system aims to adjust the imbalance in economic burdens and create a collective social responsibility among employers." Quoted from Thornton (1998).

disability employment. Therefore, to effectively promote disability employment, we need to determine whether this system can provide appropriate compensation to companies—in other words, whether this system can equalize the burden borne by all types of companies. However, a major drawback of this system is that the levy as well as grant amounts are set uniformly by the government, without acknowledging the actual heterogeneity of such burdens across companies. We can confirm the ill effects of this drawback from real data.

(Figure 1)

Figure 1 depicts the changes in the underachievement company ratio dating from the foundation of the system in 1977 to 2002.[9] The dotted line shows the group of companies with over 1,000 employees. Although this ratio has temporarily risen due to the increase in the legal disability employment rate in 1988 and 1998, overall, there appears to be a gradual tendency for it to decline. Nevertheless, in 2002, it is a little more than 70%. In addition, the solid line shows a rising trend for the group of wholly private firms; this indicates that the number of companies that have not achieved the legal disability employment rate has increased at the beginning of 2000.

According to the Survey on the Actual Status of Physically Disabled Children/Persons (Ministry of Health, Labor, and Welfare, 2003), the percentage of unemployed disabled persons with the ability to work is extremely high. Figure 1 shows a continuing situation in which disabled persons with both the will and ability to work do not find employment. This is because many companies refrain from employing disabled persons.

In the international scenario, the emission trading mechanism is similar to the Japanese quota-levy system. This scenario sets an upper limit for greenhouse gas emissions discharged by each country, and various countries can trade in carbon rights for a price. By allowing trade in carbon rights, this system aims to minimize emission reduction costs worldwide. Since carbon rights come at a fixed price, countries that find emission reduction costs to be excessively high can sell their carbon rights, while others that do not face excessive emission reduction costs can purchase them. Therefore, each country can increase its gain by reducing emissions within its territory. Under this rule, the price of carbon rights as determined by the competitive equilibrium becomes the price of minimizing the total emission reduction costs of greenhouse gases.[10]

Now let us review the quota-levy system imposed on firms with respect to disability employment. This system sets the legal disability employment rate and obliges each company to employ a certain fixed number of disabled workers. The authorities collect levies from the companies that do not achieve this legal rate and distribute most of the revenue collected to the companies that have

[9] An underachievement company ratio is the ratio of private companies that have not managed to achieve the legal disability employment rate to the total number of private companies.

[10] For the basic model of emissions trading, see Xepapadeas (1997).

achieved the target level. However, since companies are heterogeneous in nature, some enterprises can easily employ disabled persons, while others cannot. In this respect, we can view this situation in light of the market mechanism. When the levy and grant amounts are set exogenously, it is very unlikely that company burdens will be equalized. In order to promote disability employment throughout Japan, it is necessary to set the legal disability employment rate in such a way as to include the labor force of working-age disabled persons who have the ability to work, along with setting a price for a company's right not to employ the disabled. In such a case, companies that find it overly expensive to employ disabled persons can purchase the right not to employ a disabled person from companies that do not incur much expenditure on disability employment.

In this manner, each group will gain more by selling and purchasing rights than by employing the disabled only by themselves. As in the case of emission trading, under such a rule, the price determined by competitive equilibrium becomes the price of minimizing the costs incurred by all firms in Japan, which will promote disability employment.

2.2. Process of information disclosure

In Japan, only aggregated macro data regarding disability employment was available. However, the disability employment situation of individual companies in Tokyo and Osaka was publicly disclosed in 2003. The disability employment situation of the enterprises under the jurisdiction of each bureau, as of 2000, was published in Osaka on September 8, 2003, and in Tokyo on October 8, 2003.

The characteristics of the disclosed companies were different in each bureau. In Osaka, the names of companies with 1,000 or more employees, regardless of the achievement of the legal disability employment rate, were published; and in Tokyo, the names of companies that had not achieved this rate were published. The private nonprofit organizations (NPOs) that obtained this information published them on their own homepages. In Japan, there were very few cases of such information disclosure regarding disability employment before this event, and such large-scale information disclosure was the first event.[11]

3 The hypothesis of investor reaction and the design of analysis

3.1. Factors affecting investor expectations

What would be the effect of this kind of information disclosure on stock prices? To determine this, it is worthwhile to enumerate the factors affecting investor expectations.

The first factor is the expense burden borne by the company in order to comply with disability employment legislation. Whether the firm fulfills its obligatory legal rate of disability employment

[11] From 1977 to 2003, the names of only four companies had been announced. Moreover, they were all small businesses.

depends on its employer's opinion of the firm's employment obligation and the penal regulation measure of publicly announcing the company's name. Under the quota-levy system in Japan, it is very likely that the company burdens will be unequal. Therefore, companies that incur excessive expenses to employ disabled persons tend not to achieve the legal disability employment rate and instead pay the levy. However, in the case of a company with the same characteristics, but whose employer considers disability employment to be its duty, such a company will incur the costs. Conversely, a company that does not incur higher costs to employ disabled persons can easily achieve the legal disability employment rate and receive grants. As in the former case, if the latter types of companies are not able to achieve the legal disability employment rate, they are regarded as having an inefficient employment strategy and can earn more profit.

The second factor concerns investor discrimination against disabled employees. If investors think that every disabled employee has low productivity, the stock prices of enterprises employing a significant number of disabled persons might fall (Wolfers, 2006).

The third factor is investors' evaluation of the company's corporate social responsibility. However, in 2003, only a small number of investors considered disability employment as socially responsible investment in Japan (Nagae, 2005). Moreover, socially responsible investment in Japan was negatively evaluated by investors (Jin et al., 2006). This suggests that investors do not evaluate a company on the basis of disability employment as a measure of corporate social responsibility. Thus, in this study, we focus on the first and second possibilities.

3.2. The design of the analysis

The design of the analysis is as follows. First, we divided the sample companies into two groups—those that achieved the legal disability employment rate and those that failed to achieve it. Then, we estimated the change in normal stock prices before the information disclosure followed by an estimation of the differences in stock price changes for both groups after the information disclosure. At this stage, it is necessary to note an endogeneity problem. Since the company attribute is heterogeneous, different companies incur different costs to employ disabled persons. If such costs influence corporate performance, whether or not the legal disability employment rate is achieved, investor decisions will be endogenous due to the variable of corporate performance. Therefore, we need instrumental variables such as the number of employees in the past, which is highly likely to affect the firm's disability employment but not likely to influence investor decisions. Then, to determine whether firms with different attributes are employing economically efficient employment strategies and confirm the validity of the instrumental variables, we investigated the relationship between each firm's level of disability employment and its profit in 2000, when the information was collected.

Next, to confirm whether or not the second factor has any influence on the above, we analyzed the

long-term excess returns on stock prices after information disclosure. Since stock prices are influenced by various factors, the possibility of a short-term change would be anomalous (Gompers et al., 2003). Therefore, it is necessary to confirm whether the efficient market hypothesis holds. If investors believe that every disabled employee has low productivity, information disclosure would lead to a short-term fall in the stock prices of firms that employ a significant number of the disabled. However, such firms certainly show positive long-term excess returns, despite the negative short-term stock price reaction.[12] By performing a long-term analysis, we confirmed that there would be no such anomaly.

4 The impact of disability employment information disclosure: Endogeneity and estimation strategy

4.1. Estimation strategy

In this section, we explain the estimation strategy used to investigate the information disclosure's impact on stock prices in 2003. We will use the following estimation models to analyze the reaction of stock prices to the information disclosure.

$$ER_i = \beta_0 + \beta_1 R_i + \mathbf{X}_i \boldsymbol{\beta}_j + \varepsilon_i . \quad (1)$$

Here, ER expresses the short-term cumulative abnormal returns and long-term abnormal returns that are defined subsequently. R is the dummy variable that indicates whether a firm has achieved the legal disability employment rate—this takes the value of 1 if the firm achieves the legal rate and 0 if it does not. ε is the error term, and **X** represents the control variable matrix, which is unrelated to the information disclosure but affects stock price changes.

β_1 indicates the impact on stock prices: it shows the difference of this impact between the average (cumulative) abnormal return of the underachieving and those 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.

Considering the influence of corporate performance, the variable indicating whether or not a firm benefits by achieving the legal disability employment rate has endogeneity because this allows us to consider two possibilities based on which the information disclosure may influence the firm's stock prices. The first possibility suggests that information disclosure regarding the disability employment situation directly influences stock prices. The second possibility is that certain company attributes that strongly relate to the employment of the disabled also affect corporate performance, and such

[12] This trial has already been 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 stock price data.

corporate performance is reflected in the stock prices. When R in equation (1) has endogeneity, if we estimate (1) using ordinary least squares (OLS), β_1 does not satisfy the consistency. Therefore, we need to employ the two-stage least squares (TSLS) estimator. In the first step, we use **X** and the instrumental variable **Z**, which influences disability employment but not the investor decisions; these variables are assumed to be independent, and we estimate the following reduced form by OLS.

$$R_i = \alpha_0 + \mathbf{Z}_i\boldsymbol{\alpha_1} + \mathbf{X}_i\boldsymbol{\alpha_2} + u_i . \quad (2)$$

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

4.2. The definition of excess return

4.2.1. Short-term excess return and cumulative abnormal return

In the short-term analysis, we have used the cumulative abnormal return derived using the event study methodology as a dependent variable.[13] Event study, pioneered by Fama et al. (1969), measures the rate of change in stock prices due to the occurrence of an event as compared with the expected rate of change had the event not occurred. It is a technique of testing the impact of an event by analyzing the deviation. There is no established methodology for this technique; however, in general, many researchers use a two-step estimation method, which can be explained as follows.[14]

First, we define the event of interest. This is to specify the time when investors obtain information regarding the event. In general, investors are not necessarily aware of the event on the very day of its occurrence; even if investors are rational, it takes some time for the information to spread. In this case, the event day should be extended by several days to the day on which the stock prices show the influence of the event. The period after which it is predicted that the event will influence the stock prices is called an event period (event window; L_2).[15]

[13] This methodology is frequently used in corporate policy decision making (Kothari and Warner, 2007).
[14] This explanation is based on that provided by Mackinlay (1997) and Campbell et al. (1997).
[15] To investigate whether the influence of the event is sustained, we must decide the last part of the event to be denoted by (L_3).

(Figure 2)

After defining the event, we estimate what the stock market earning rate would have been during the event period had the event not occurred. For this, it is necessary to decide which estimation model should be used. The most widely used estimation model is the market model, which examines the trends in the rates of normal returns before and after a particular event, excluding any shock that would affect the portfolio in the overall stock market. The market model uses the overall risk in a market portfolio (the rate of return on the Tokyo Stock Price Index [TOPIX] in this article) as a criterion to calculate the expected rate of return from individual shocks. Let $R_{i\tau}$ be firm *i*'s daily return on day *t*, and $R_{m\tau}$ be the market's daily return on day *t*. After regressing $R_{i\tau}$ on $R_{m\tau}$, the market model value can be obtained as follows:

$$R_{i\tau} = a_i + b_i R_{m\tau} + \varepsilon_{i\tau}. \tag{3}$$

After defining the model, we measure the abnormal movement of stock prices due to the event's occurrence. First, the period during which stock prices are not affected by the event is called the estimation period (L_1). This estimation period is used to estimate model (3) for a company. At this stage, it is assumed that investors trade stocks immediately after they acquire new information. Therefore, the daily individual stock price changes are assumed to occur independently of each other. The estimated value obtained explains the normal stock price changes of each equity.

Next, the abnormal movement of stock prices due to the event is measured by using the estimated value obtained above. The abnormal movement of stock prices is defined as the difference between the price-earnings ratio forecast in the estimation period and that in the event period, which can be obtained as follows:

$$ER_{i\tau} = R_{i\tau} - (\hat{\alpha}_i + \hat{\beta}_i R_{m\tau}). \tag{4}$$

Here, $ER_{i\tau}$ shows the excess return on firm i's stock price on τ business days, where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimators of α_i and β_i, respectively. As shown in Figure 2, time is assumed to be τ; the first and last days of the estimation period are assumed to be T_0 and T_1, respectively; the last day of the event period is assumed to be T_2. Therefore, the estimation period and the event period are $L_1 = T_1 - T_0$ and $L_2 = T_2 - T_1$, respectively. Under null hypothesis, H_0, the event has

no impact on the mean or variance of returns, and the abnormal returns follow a normal distribution with mean 0 and the following variance:

$$\hat{\sigma}^2(ER_{i\tau}) = \hat{\sigma}_{\varepsilon_i}^2 \left\{ 1 + \frac{1}{L_1} \left(1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{\hat{\sigma}_m^2} \right) \right\}, \tag{5}$$

where

$$\hat{\mu}_m = \frac{1}{L_1} \sum_{\tau=T_1+1}^{T_2} R_{m\tau} . \qquad \hat{\sigma}_{\varepsilon_i}^2 = \frac{1}{L_1 - 2} \sum_{\tau=T_0+1}^{T_1} (R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau})^2 . \qquad \hat{\sigma}_m^2 = \frac{1}{L_1} \sum_{\tau=T_0+1}^{T_1} (R_{m\tau} - \hat{\mu}_m)^2 .$$

To determine the event's influence on stock prices, it is necessary to obtain the excess return index for the entire event period. The value of excess returns on each day of the event period accumulated over the entire period is used as the index. This index is called the cumulative abnormal return (CAR). Assuming $T_1 < \tau_1 \le \tau_2 \le T_2$, the accumulated value of excess returns between τ_1 and τ_2, or CAR, is obtained as follows:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} ER_{i\tau} . \tag{6}$$

The estimated value of the variance of CAR is derived by adding (5) to the event period.

4.2.2. Setting the estimation and the event periods

Certain disadvantages of the event study methodology have been pointed out. First, investor expectations from the information disclosure on the event day may not be the same (Card and Krueger, 1997).[16] That is, in this case, the stock price reaction will differ according to corporate attributes. Second, it is difficult to capture the timing of the event. If the information regarding the event is already well known, investor expectations will already be reflected in the stock prices. In this case, it becomes impossible to identify whether the detected influence is due to the event or not.

[16] 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 (event). However, they could not obtain consistent interpretation to detect a possible impact, and pointed out that this was because the investors had different expectations from the company with respect to stock prices, even though raising the minimum wages influenced the company's profit.

In this study, we dealt with the above problem in the following manner: First, we divided the sample into groups according to employee scale, industry, and regional attributes; and using the window after the event (L_3), we checked whether the information impact on stock prices continued.[17] By doing so, we were able to verify whether investors had equal expectations from each group. Second, the event days were set as September 22, 2003, for Osaka and October 22, 2003, for Tokyo, which were the dates on which the indicated corporate names were published on the two homepages of the "Shareholders Ombudsman" and "DPI Japan conference," respectively.[18] 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. These are standard periods in accordance with the previous studies that have used event study methodology. From the results obtained from these estimation and event periods, we selected the most typical periods. Thereafter, assuming that the investors reacted to the information disclosure, we identified the respective estimation and event periods during which this typical pattern was displayed. Based on the above procedure, we can arrive at the short-term dependent variable, CAR, from the event period of 11 days and estimation period of 240 days.

4.2.3. Long-term dependent variable

For the long-term analysis, We evaluated the buy-and-hold abnormal return (BHAR). Let $R_{i\tau}$ be firm *i*'s daily return on day *t* and $R_{m\tau}$ be the market portfolio's daily return on day *t*. Then, BHAR can be determined as follows:[19]

$$BHAR_i = \prod_{t=1}^{T}(1+R_{i\tau}) - \prod_{t=1}^{T}(1+R_{m\tau}) \quad (7)$$

.

We selected two periods during which the short-term impact of the event was considered to have disappeared—from 30 days to one year after the event and from 30 days to two years after the event.

4.2.4. The relationship between short-term and long-term excess returns

The relationship between the short-term and long-term excess returns shows the influence of the information disclosure. Figure 3 shows the change in excess return in the form of a solid line with an arrow. On the day of the event (S), the information reaches the public. At this time, there are three possibilities with respect to the change in short-term excess returns from T_0 to T_1—it will either

[17] We selected a 11-day window beginning from day 1 to day 11 of the event period.
[18] We performed the analysis assuming that the days on which the information was disclosed by the Osaka and Tokyo labor bureaus were the event days. However, we were unable to obtain a unified interpretation of these two events.
[19] The proxy variable of the market portfolio is Topix (Tokyo Stock Price Index).

rise or fall, or remain constant. Let us consider the first two possibilities. After a rise (or fall) in the short-term excess return, if the information exerts no long-term influence, the change in the long-term excess return becomes constant (i.e., the efficient market hypothesis holds (E1), (E2)). In the event of an anomaly, the change in the excess return should rise (fall) in the short-term and then fall (rise) in the long-term, which is depicted by using the dotted lines (mistake-based discrimination (M)).

(Figure 3)

4.3. Validity of the instrumental variable

4.3.1. The cross-sectional relationship between disability employment and the company's profit in 2000

In this subsection, we investigate the relationship between disability employment and company profit at the time of data collection pertaining to the disclosure, for the following reasons: First, to check the validity of the instrumental variable and second, to check whether firms earn greater profit by hiring more disabled workers under the quota-levy system. This is because if the quota-levy system has equalized the costs associated with employing the disabled for each firm, then there should be no cross-sectional relationship between profitability and disability employment. We employ the estimation method that was developed by Hellerstein et al. (2002) to test the short-term implications of the employer discrimination hypothesis propounded by Becker (1972); this method is called the "market test." This model confirms that the employee attribute (for example, race, sex, and so on) ratio and company profit are not correlated if a company pays wages to employees in accordance with their productivity. In this study, in line with Sano (2005) and Kawaguchi (2007), who verified the employer sex discrimination hypothesis by using the market test in Japan, we used the following estimation model:

$$profit_i = \beta_0 + \beta_1 \frac{D}{L} + \beta_2 capital_i + \beta_3 Debt_i + \beta_4 age\_firm_i + \beta_5 age\_labor_i + \beta_6 d\_industry_i + \varepsilon_i \quad (8)$$

.

The dependent variable $profit_i$ is a proxy variable for profitability, defined as operating income/total sales, which is essentially the price-cost margin. The operating income does not correspond to economic profit without subtracting the opportunity cost of capital. The discrepancy between the operating income and economic profit depends on each firm's amount of capital. To deal with this issue, we included a fixed assets/total sales ratio, denoted as $capital$ in the

regression. The variable D/L is the proportion of disabled employees to the total number of employees. Debt ratio ($Debt$) is used to control the impact of debt on profit during a negative shock in the market. The variable age_firm indicates the firm's age. Since older firms tend to hold obsolete capital, their assets/total sales ratio may not reflect the real value of capital efficiency; and since older firms may also hold a significant amount of intangible capital, such as advanced research and development, know-how, or an established brand name, it is important to control for this variable. The variable $d\_industry$ represents industry dummies. Moreover, the average employee age is used to control for a peculiar attribute such as a payroll cost of the firm. The OLS is used as the estimation method, and we have assumed heterogeneity of the error term using a method explained by White (1980).

4.3.2. Selection of the instrumental variable

The attributes of a company and its human resource management are sure to strongly influence the achievement of the legal disability employment rate. Therefore, these factors strongly correlate with R for the estimation models (1) and (2). These are predetermined variables that have been decided before the information disclosure and therefore cannot be regarded as determinant factors of the stock price change for the information disclosure. Therefore, they become instruments of the instrumental variable $\mathbf{Z}$.

To begin with, the first instrument of the instrumental variable is the number of employees. Under the quota-levy system, a firm is expected to employ a fixed percentage of disabled persons. However, it is very rare that the legal disability employment rate corresponds with the optimum number of disabled employees for a firm. Since the quota-levy system is designed in such a way that the burden rates differ depending on the employee scale, whether or not this legal rate is achieved will strongly depend on its employee scale.[20]

Second, the year of the company's establishment influences its disability employment compliance. Since issues of specific populations attract considerable social interest, it is very likely that the disability employment in a private firm has been strongly influenced by social trends. For instance, when the quota-levy system was introduced in Japan, the newspapers constantly focused on and criticized the banking industry's non-compliance with the legal disability employment rate requirement, even though it was believed to be difficult to achieve the legal disability employment rate of 1.5% at that time.[21, 22] In addition, the large enterprises that achieved this legal rate one after

[20] The levy duty is imposed on companies with over 301 employees. However, the quota duty is imposed on companies with more than 56 employees.

[21] For example, the editorial titled "Acceptance of disabled persons in companies" published in Mainichi Shimbun, a famous daily newspaper in Japan, dated October 31, 1977, as well as another article in the "Economist" dated November 1, 1977, stated that the quota-levy system was introduced in such a manner as to suggest that it is the company's duty to employ the disabled.

[22] We can regard this criticism as applicable to the entire regulation industry of this country. Under such a

the other in the first half of the 1980s made news.[23] These events suggest that corporate activity directed toward disability employment is strongly influenced by social trends. The prevalent social norms during the establishment years of old enterprises included support for disability employment, which would have provided the companies with incentives for hiring disabled employees. Moreover, such companies would have had adequate know-how regarding the employment of the disabled.

Third, the human resource management of a firm influences its employment patterns. Rapid aging is a concern with many large Japanese companies. Among the full-time workers in big companies, that is, companies with more than 1,000 employees, the percentage of employees aged 45 years or older has rapidly risen from 31% in 1990 to 36% in 1998 (Genta, 2001). Since it is common knowledge that most disabled employees in a private enterprise are disabled persons who suffered a handicap during the period of employment, we use the average yearly income and average age as variables to represent the human resource management of the company (Tezuka, 1999).

When the rational expectations and efficient market hypotheses of the semi-strong form hold, past public information does not influence stock prices (Fama, 1970). Therefore, these instrumental variables are entirely based on the data collected from individual companies in 2000, when the information was collected.

4.3.3. Data, descriptive statistics, and the estimation results

4.3.3.1. Data and descriptive statistics

The homepage of the Shareholder Ombudsman announced the names of 290 companies with 1,000 or more employees (hereinafter, referred to as "large firms") that the Osaka Bureau of Labor had made public. Moreover, the homepage of the DPI Japan conference printed the names of 9,012 companies that had not achieved the legal disabled employment rate made public by the Tokyo Bureau of Labor. Among them, we selected this study's samples from the firms whose stocks are traded on the First Section of the Tokyo Stock Exchange. Other data used in this study includes the information for the year 2000 collected from the Corporate Financial Databank and compiled by the Nikkei Economic Electronic Databank System (NEEDS).

According to the Survey on the Actual Employment Status of Persons with Physical Disabilities

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system, it was expected that achieving the legal disability employment rate would be difficult. Documents from the time of the system's establishment indicate that a governmental body was proposed that could take the lead in achieving the required rate of employment, along with obtaining civilians' consent (Tezuka, 1999).

[23] For example, the famous Japanese daily, Asahi Shimbun, published an article on March 30, 1981, which highly praised Fujitsu's achievement of the legal disability employment rate and its positive step of offering incentives for employing the disabled. Another Japanese daily, Yomiuri Shimbun, carried an article on June 5, 1981, regarding Nissan's achievement of the disability employment rate of 1.5%—the first for the automobile industry. On June 11, 1981, the Asahi Shimbun reported Fuji Bank's achievement of a disability employment rate of 1.53%, when the legal disability employment rate for financial institutions was only 1.5%, and so on.

and Persons with Intellectual Disabilities (Ministry of Health, Labor, and Welfare, 2003), the distribution of disability employment is as follows: While 71.1% of disabled persons are employed in the non-manufacturing industries, 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. Tables 1-1 and 1-2 report descriptive statistics.

(Table1-1, Table1-2)

4.3.3.2. Estimation results

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

In columns (7) and (8), both groups show negative effects, but these are not significant. The results in columns (3) and (6) are similar. Although the detection power may be relatively poor due to the meager number of samples from Osaka, the data suggest that both the achieving and underachieving companies choose their optimal employment strategy. If the investors agree that the employment strategy of the firm is optimal, the estimation model may not detect the information disclosure's influence on stock prices.

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

be different for manufacturing and non-manufacturing businesses.

On the basis of the analysis in this subsection, it is evident that disability employment relates to firm profit for some groups.[24] Although corporate performance, which investors regard as an index for trading equities, is not always the same among firms, there is a high possibility that it is linked to company profits. Therefore, we need to perform instrumental variable estimation. Moreover, although the results in this section cannot be used to remove the fixed effects or specify the causal relation, the lack of correlation between profit and disability employment suggests the possibility that each group in Osaka has managed to operate under its optimal employment strategy. In addition, there is a possibility that the burden increases when the legal disability employment rate is achieved because the ratio of disabled employees does not correlate with profit for the underachieving large manufacturing enterprises in Tokyo. However, in the small- and medium-sized manufacturing and non-manufacturing enterprises in Tokyo, underachievement of the legal disability employment rate shows the possibility that they are not operating under their optimal employment strategy.

(Table 2)

5 Data and descriptive statistics

In the following section, we explain the data used to estimate the impact of information disclosure and provide descriptive statistics regarding our analysis. In addition to the samples used in subsection 4.3.3, we used data regarding those firms in Tokyo that achieved the legal disability employment rate. These are the enterprises having their headquarters in Tokyo, where their annual financial statements were submitted, and the names of which were not published on the homepage of the DPI Japan conference.[25] Table 3 lists the selected enterprises according to the type of industry and employee scale. From this table, we find that with respect to the distribution of industries, the percentage of non-manufacturing firms that have managed to achieve the legal disability employment rate has increased. This is because non-manufacturing firms include industries in which it is easier to employ disabled persons, for example, service, wholesale, and retail industries. The samples used in this context do not differ greatly across Japan.[26]

(Table 3)

[24] When we check the correlation between normal profits and the proportion of disabled employees, we find significant positive relations in the large companies of Tokyo and significant negative relations in Osaka companies that have achieved the legal disability employment rate. Therefore, the correlation is robust, indicating that in some groups, disability employment is correlated to the firm's performance.

[25] According to Japan's quota-levy system rules, a company having main offices in both Tokyo and Osaka, the main office is assumed to be in the district where it has been registered.

[26] See section 4.3.3.

Stock prices and market capitalization data were obtained from Nikkei NEEDS Financial Quest, while financial data were obtained from the Corporate Financial Databank and the Kaisha Shikiho (Quarterly Corporate Report).

(Table 4-1, Table 4-2)

Tables 4-1 and 4-2 comprise descriptive statistics regarding the manufacturing and non-manufacturing firms, respectively. The respective values of CAR, the two- year BHAR, and the variance estimate of CAR are presented in the tables.

6 Estimation results

6.1. The short-term results

In this subsection, we discuss the short-term results. In the event study methodology, the estimated variance value in the estimation period is used to statistically verify whether or not the value of CAR is 0. This information is required for the regression analysis using CAR. Therefore, in order to formulate the estimation model (1) wherein the short-term CAR is set to be a dependent variable, we have performed weighted least squares estimation (WLSE) in which the standard deviation of CAR during the estimation period is weighted (Mckenzie and McAleer, 1998).

(Table 5-1, Table 5-2)

Tables 5-1 and 5-2 show the results for manufacturing and non-manufacturing firms obtained by assuming the short-term CAR to be a dependent variable. Columns (1) and (2) show the estimation results for the large firms in Tokyo, columns (3) and (4) show those for the small- and medium-sized firms in Tokyo, and columns (5) and (6) show the results for the large firms in Osaka. Moreover, columns (1), (3), and (5) show the results of the weighted least square estimates that control for the corporate scale in the stock market as well as industry, while columns (2), (4), and (6) show the results of the TSLS estimates, which take into consideration factors that may influence the achievement of the legal disability employment rate.

In both the tables, we have reported the findings of the following tests: (i) the Durbin-Wu-Hausman test, which tests whether the legal disability employment rate achievement in relation to the stock price reaction is an endogenous variable; (ii) the over-identifying restrictions test, which tests whether the instrumental variables have any correlation with the error term; and (iii) the first-stage F-test, which tests whether the instrumental variables affect the endogenous variable.[27]

[27] The over-identifying restrictions test is usually called the Sargan's test. However, for long-term

In this study, we concluded that the instrumental variable was valid, if all these tests cleared it.[28]

First, we describe the results for the manufacturing firms. In each table, we have presented the marginal effects of the probit estimation results and their significance with respect to estimation model (2) in order to examine the influence of corporate attributes on the likelihood of an endogeneity bias. 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 the small- and medium-sized enterprises in Tokyo, firms with few employees tend to achieve the legal disability employment rate. Regarding the large firms in Tokyo, since the coefficient of the average annual salary is significantly negative, it is evident that the firms that achieved the legal disability employment rate offered lower wages. In contrast, in Osaka, firms with substantial numbers of employees achieved the legal disability employment rate. Further, the significant positive effect relating to the operational years indicates that the large enterprises that have long addressed the issue of disability employment achieved the legal disability employment rate.

The instrumental variables are valid only for Tokyo, not for Osaka. Therefore, judging from columns (2) and (4) for Tokyo and column (5) for Osaka, all groups show a significant negative effect.

Next, we would like to describe the results for the non-manufacturing firms. In the small- and medium-sized firms in Tokyo, the number of employees are few, while their average age is high. Moreover, at its establishment, a new firm tends to achieve the legal disability employment rate. Since the average age is high, this group possibly comprises many disabled employees who became disabled when working. However, the attributes of such firms are the least influential among those of the other groups.

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analysis, we have used the Hansen J test, since I have used White's method (1980) to deal with heterogeneity. Regarding the similarities between both the tests, see Hayashi (2000).

[28] The validity of the instrumental variable that cleared these tests is high; however, there is a possibility of weak instruments—when the correlation between the instrumental variables and the endogenous variable is low, the reliability of the TSLS estimator becomes lower (Staigner and Stock, 1997). Therefore, we performed 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 estimation for the large-scale manufacturing industries in Tokyo, the coefficient is –0.1704 and the p-value is 0.0310; while in the long-term estimation (Tokyo), the coefficient is –0.3382 and the p-value is 0.4157. However, with respect to the short-term estimation for small-scale manufacturing industries in Tokyo, the coefficient is –0.0576 and the p-value is 0.1776. Therefore, we have estimated only the employee scales showing a stable relation with the endogenous variable as the instrumental variable; the coefficient is –0.2156 and the p-value becomes 0.000. In this way, we have obtained the same results in this study. In this instance, the first-stage F value is 30.64. Based on the Stock and Yogo (2005) test, the critical value when the TSLS bias of the confidence interval is less than 10% is 16.38. In this way, we have confirmed that the instrumental variable has sufficiently high reliability. From the above, 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, as described in this study. For the instrumental variable methodology and the problem of weak instruments and their measurement in particular, see Murray (2006).

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

6.2. The long-term results

In this section, we would like to confirm the long-term results. Table 6 shows the estimation results for the manufacturing and non-manufacturing firms that were obtained using the two-year BHAR as the dependent variable.[29] Columns (1), (3), and (5) show the results of the OLS estimation, which assumes heterogeneity in the error term and controls for the industry and the corporate scale in the stock market. Columns (2), (4), and (6) show the result of the TSLS estimate, which takes into consideration factors that may influence the achievement of the legal disability employment rate.[30]

(Table 6)

Since 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 in the large-scale manufacturing firms in Tokyo, achieving the legal disability employment rate tends to have a considerable influence on the firm's long-term equity value; however, the influence is lost when we consider the endogeneity bias (see column (4)).

6.3. Summary and interpretation

We collected all the obtained results. First, we review the short-term results. In the manufacturing sector, there are significant negative differences between the stock prices of firms that do not achieve the legal disability employment rate and the stock prices of those that achieve this legal rate. A similar difference was detected for the small- and medium-sized non-manufacturing enterprises in Tokyo. However, in the large-scale non-manufacturing enterprises in Tokyo, there is a significant positive difference between the above two types of firms.

A long-term influence is not observed in any group. The data reveal that the efficient market hypothesis of the semi-strong form holds; furthermore, there does not appear to be any anomaly based on the investor's belief that disabled employees have low productivity. Therefore, the short-term results pertaining to the disability employment situation reflect the true value of the firm.

[29] The results for long-term impact after one year were similar to those after two years.

[30] For the OLS estimation, I assumed heterogeneity and dealt with the error using a method suggested by White (1980).

With respect to the short-term changes, in both the manufacturing and non-manufacturing enterprises, the stock prices of the firms that had not achieved the legal disability employment rate rose, while the stock prices of the firms that had achieved this rate fell. This indicates that the penal regulations measure mandated in the disability employment policy in Japan, of publicly announcing the underachieving company's name, may be ineffective—in fact, the disclosure of such information through this measure might raise the stock price.

A negative impact was detected in the manufacturing sector. In this type of business, the investors judged that if a firm employs more disabled persons than is legally required, the firm incurs considerable costs. This is consistent with the estimation results in Section 4.3. If a large firm does not achieve the legal disability employment rate, its profit does not correlate with the proportion of disabled employees. In other words, the firm's human resource management is performed efficiently. Moreover, the small- and medium-sized firms already incur considerable costs.

Although the provision is now being abolished, the disability employment measures had once contained exclusion rate regulations that reduced the legal disability employment rate for those businesses that could not easily employ disabled persons. Since many manufacturing businesses have to conform to such regulations, it is clear that employing disabled persons would involve higher costs for manufacturing businesses as compared with that for non-manufacturing businesses. When the attributes of firms include a small number of employees and low wages, disabled persons can be employed at a lower cost. This strongly influences the stock price reactions, indicating whether the legal disability employment rate achievement is good or bad for the firm. This interpretation is also justified by the presence of an excessive bias in the estimated value. Then, why were the significance level and the magnitude regarding the impact on stock prices low in Osaka? With regard to the attributes of the firms that achieved the legal disability employment rate in Osaka, the employee scale was large and the firms had been operating for many years. It has been pointed out that such firms possess sufficient know-how regarding the employment of the disabled. Moreover, economies of scale apply to these firms. In Section 4.3., the coefficient of this group is not significant but negative. The lack of significance may be due to the fact that the fixed effects of this group of firms cannot be controlled.

Although a negative effect was detected for the small- and medium-sized non-manufacturing firms, a positive effect was detected for the large-scale non-manufacturing firms in Tokyo. The detection power is low because of the meager sample size from Osaka; however, the coefficient value is negative, and these results are also consistent with the estimation results in Section 4.3.

The positive effect that is detected in the large enterprises of Tokyo is possibly because the optimum number of disabled employees in this type of business exceeds the legal disability employment rate. It is assumed that the investors understood the information regarding underachievement of the legal disability employment rate as signaling that the optimum number of

disabled employees was not achieved; that is, the firm had failed to maximize profits. As noted above, a substantial number of persons with disabilities are employed in non-manufacturing businesses. Many regulated industries are included in this business sector; in the banking industry, in particular, there is considerable scope to employ the disabled, which has been pointed out through social criticism. Moreover, many such businesses, although they may be privatized at present, were formerly managed by the government. Since the legal disability employment rate in government organizations is higher than that in private enterprises, government-managed companies that have been privatized already employ many disabled persons. Such companies do not incur the initial fixed costs needed for employing persons with disabilities, and they certainly have sufficient know-how regarding disability employment. Thus, if investors are already aware of smoothly functioning regulated industries and formerly government-managed companies that employ a substantial number of disabled workers, they tend to believe that profit maximization involves employing the optimum number of disabled employees in excess of the legal disability employment rate.

7 Conclusion and Remarks

This study analyzed the ramifications of information disclosure on each firm's disability employment rate by using data from events conducted in Tokyo and Osaka in 2003. Using the event study methodology, this study verified the difference between the stock-price changes observed in two groups after the information disclosure—the firms employing fewer disabled employees than legally required and those satisfying the standards set—by the instrumental variable (IV) estimation. In addition, we estimated the cross-sectional relationship between the proportion of disabled employees and each firm's profit in 2000, when the information was collected.

The estimation results are summarized as follows. First, there is no significant difference between the above two groups of firms in terms of disability employment with regard to the excess return of long-term stock prices. Second, among the small- and medium-sized firms and the manufacturing firms, there is a significant negative difference between those two groups of firms with regard to the excess return of short-term stock prices. Third, among the large-scale non-manufacturing firms in Tokyo, there is a significant positive difference between the two groups of firms with regard to the excess return on short-term stock prices. Fourth, these results are consistent with the cross-sectional relationship between the proportion of disabled persons employed and the profit for each firm in 2000, when the information was collected.

The main objectives of the Japanese quota-levy system are to promote disability employment and equalize the company burden accompanying disability employment. The estimation results suggest the following: First, we cannot deny the penal regulations measure may not be effective because for some companies, it offers new information that may raise the stock price. Second, the manufacturing industry and medium- and small-sized businesses face a prohibitive expense burden for disability

employment and therefore fail to achieve the legal disability employment rate. Third, the legal disability employment rate achievement burdens are not equal for the manufacturing and non-manufacturing industries.

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, the authorities need to promote the general employment of persons with disabilities.[31] For this reason, it is necessary to amend the present quota-levy system in Japan. As suggested in Section 2, one economically viable solution would be to set a price on the right not to employ disabled persons.[32] However, before introducing such a mechanism, we need to specify the economic costs of disability employment for the firm. Consequently, there is a pressing need for an overall policy assessment of the quota-levy system, including the measures adopted to promote disability employment.

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[31] In Japan, the disabled are provided employment through a special welfare system for those who are willing to work. This is because the mainstream employment system is heavily biased against the limited abilities of the disabled, who find regular work difficult. The labor law is not applicable to this employment system. In this study, the term "general employment" is used to contrast with work obtained through the special welfare system that assists those who wish to work. Therefore, general employment implies "regular" or "usual" employment.

[32] However, there is no consensus regarding the realistic validity of such a mechanism in economics.

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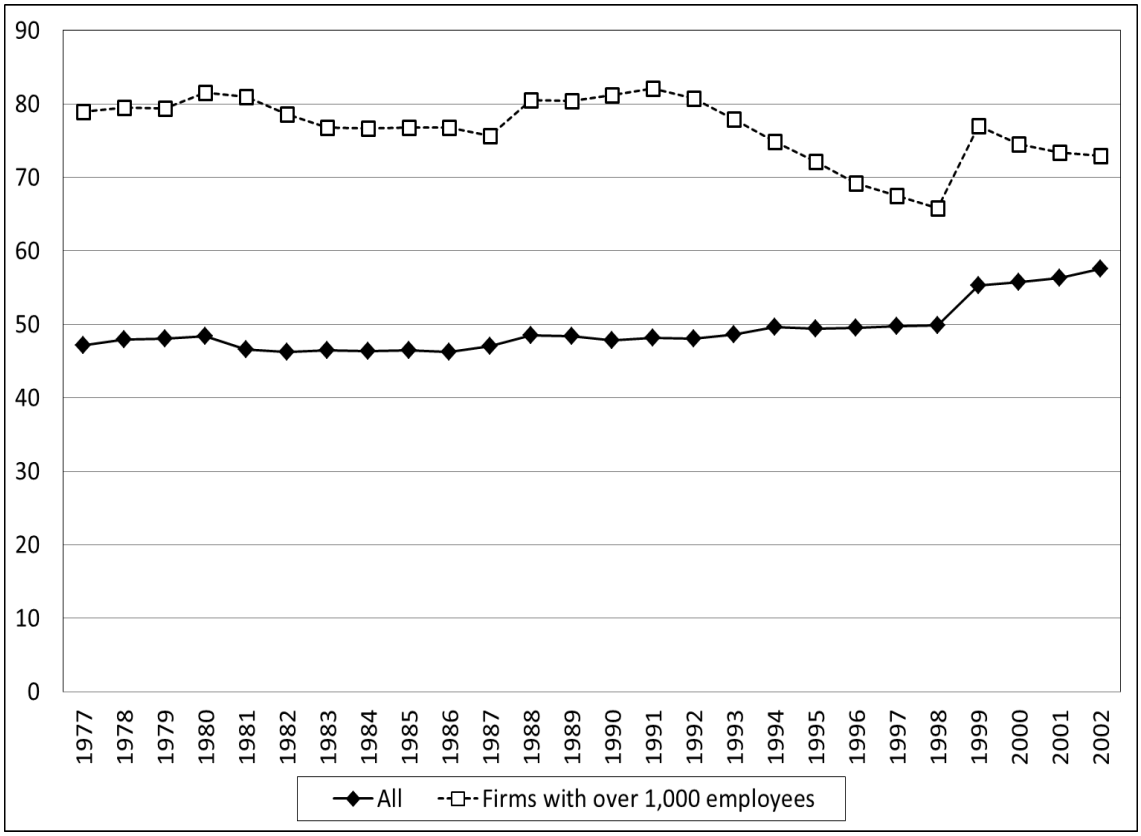
Figure 1. Changes in the underachievement company ratio from 1977 to 2002.



Note: The legal disability employment rate was increased in the years 1988 and 1998. Therefore, the underachievement corporate ratio temporarily increased for those years.

Source: Current state of employment of physically handicapped and mentally deficient individuals, The Ministry of Health, Labor, and Welfare

Figure 2. Concept chart of the event study methodology

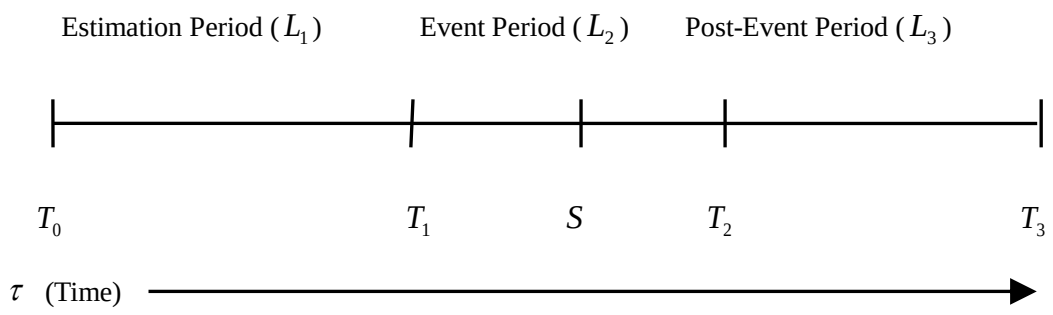


Figure 3. Concept chart of the rate of expected excess return after information disclosure

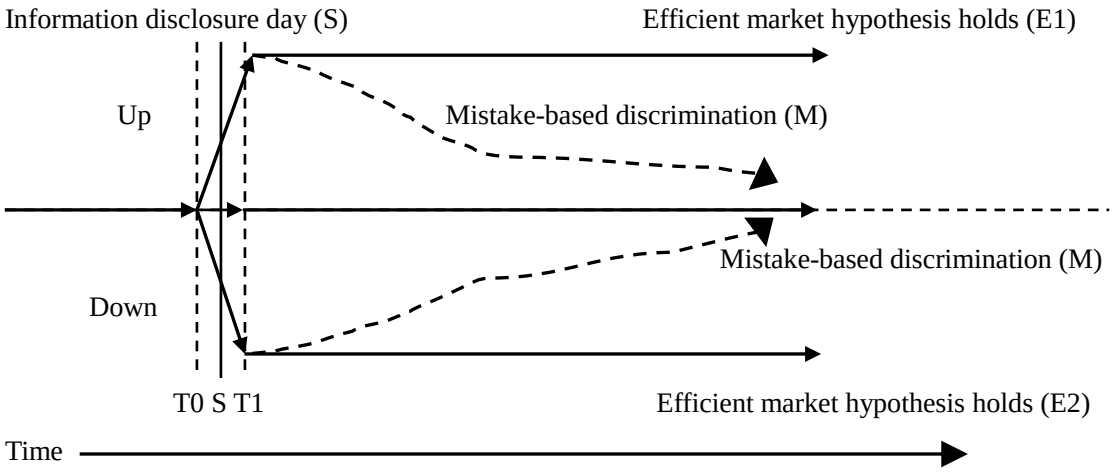


Table 1-1. Descriptive statistics to analyze the relationship between the firm profit and the rate of disability employment in manufacturing firms

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Operating income/sales (%)					
Tokyo small and medium	86	0.0544	0.0708	–0.109	0.3577
Tokyo large	190	0.0443	0.0533	–0.1062	0.3107
Osaka	76	0.0611	0.0778	–0.0056	0.4715
Proportion of disability employment					
Tokyo small and medium	86	0.01	0.0041	0	0.0165
Tokyo Large	190	0.0129	0.0026	0.003	0.0179
Osaka	76	0.0164	0.0037	0.0081	0.0272
Fixed assets/total sales					
Tokyo small and medium	86	0.2024	0.1582	0.029	0.9464
Tokyo large	190	0.1511	0.0783	0.0218	0.4564
Osaka	76	0.1621	0.1075	0.004	0.5402
Debt/total sales					
Tokyo small and medium	86	0.6791	0.3533	0.147	1.603
Tokyo large	190	0.7079	0.3224	0.2066	1.8366
Osaka	76	0.6578	0.3389	0.1307	1.9864
Age of the firm					
Tokyo small and medium	86	62.5	15.417	30	101
Tokyo large	190	64.895	16.926	10	123
Osaka	76	69.987	20.673	3	116
Average age of employees					
Tokyo small and medium	86	38.926	3.111	30.9	46.7
Tokyo large	190	39.155	2.509	30.1	44.2
Osaka	76	38.907	2.619	29.8	44.5

Note: “Tokyo small and medium” indicates the group of firms in Tokyo with a scale of less than 999 employees. “Tokyo large” indicates the group of firms in Tokyo with a scale of over 1,000 employees, and “Osaka” indicates the group of firms in Osaka with a scale of over 1,000 employees.

Table 2. The relation between firm profit and the rate of disability employment

	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 disability 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

Note: Standard errors are in parentheses under the regression coefficients. OLS standard errors are robust standard errors. ***, **, and * denote significance at 1%, 5%, and 10%, respectively, for the two-sided test. The industry dummies are included in all the estimation models. “Tokyo small and medium” indicates the group of firms in Tokyo with less than 999 employees. “Tokyo large” indicates the group of firms in Tokyo with over 1,000 employees, and “Osaka” indicates the group of firms in Osaka with over 1,000 employees.

Table 3. Industries to which the 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	Mining	2(1)	0(2)	0	0
Rubber Products	0(0)	2(1)	1	0	Construction	41(7)	10(7)	4	7
Other Products	12(3)	3(7)	4	1	Electric Power & Gas	1(0)	1	0	2
Pulp and Paper	5(0)	1(3)	2	0	Transportation & Warehouses	10(5)	8(10)	1	4
Pharmaceuticals	15(4)	1(1)	4	5	Information & Communication	26(13)	10(6)	3	0
Chemicals	28(20)	9(7)	7	6	Wholesale Trade	18(36)	5(21)	5	2
Oil & Coal Products	2(3)	1(1)	0	0	Retail Trade	16(14)	9(8)	8	2
Transport Equipment	9(0)	8(0)	4	1	Banks & Insurance	13(8)	14(12)	2	1
Machinery	18(15)	5(9)	5	4	Real Estate	5(13)	1(10)	0	0
Textile & Apparels	7(8)	1(6)	6	3	Services	13(10)	5(8)	1	1
Metal Products	4(4)	2(6)	0	0	Total non-manufacturing firms	153(108)	63(84)	24	19
Glass & Ceramic Products	6(3)	1(2)	0	0	Sum Total	345(195)	129(158)	69	51
Precision Instruments	8(5)	2(2)	1	0					
Iron & Steel	5(1)	2(8)	2	1					
Electric Appliances	42(15)	17(11)	5	6					
Total manufacturing firms	192(87)	66(74)	45	32					

Note: The sample firms with an employee scale of less than 999 employees are in parentheses. All firms in Osaka employed more than 1,000 people.

Table 4-1. Descriptive statistics of the variables used to analyze the impact of the disability employment information disclosure (manufacturing)

Groups	Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Tokyo small and medium	CAR	161	0.0025	0.0706	–0.2190	0.2382
	Variance estimate	161	0.0010	0.0012	0.0001	0.0132
	LEA dummy	161	0.4596	0.4999	0.0000	1.0000
	Market capitalization1	161	23.6623	0.9266	21.7974	27.0797
	Number of employees	161	6.0277	0.9346	1.7918	6.9027
	Average yearly income	161	6.3189	0.1912	5.7881	6.9575
	Average employee age	161	3.6617	0.0862	3.4308	3.9240
	Age of the firm	161	4.0887	0.2979	3.2189	4.7536
	BHAR	156	0.3637	0.6731	–0.7394	2.7310
	Market capitalization2	156	23.7918	0.9039	21.8942	27.2458
	Profit rate in 2003	156	0.0213	0.1337	–1.5417	0.1668
Tokyo large	CAR	258	0.0234	0.0904	–0.5885	0.3700
	Variance estimate	258	0.0006	0.0006	0.0001	0.0054
	LEA dummy	258	0.2558	0.4372	0.0000	1.0000
	Market capitalization1	258	25.3150	1.3703	22.6648	29.2777
	Number of employees	258	7.9960	0.8679	6.9088	10.9944
	Average yearly income	258	6.4136	0.1762	5.7696	6.9256
	Average employee age	258	3.6633	0.0718	3.4045	3.8816
	Age of the firm	258	4.1148	0.3105	2.1972	4.8040
	BHAR	246	0.1152	0.5490	–0.9504	2.8994
	Market capitalization2	246	25.4697	1.3475	22.8639	29.3056
	Profit rate in 2003	246	0.0324	0.0412	–0.0970	0.2566
Osaka	CAR	77	–0.0514	0.0927	–0.3253	0.2820
	Variance estimate	77	0.0007	0.0007	0.0001	0.0058
	LEA dummy	77	0.4156	0.4961	0.0000	1.0000
	Market capitalization1	77	25.4879	1.3023	23.1198	29.0021
	Number of employees	77	7.9869	0.8507	6.9157	10.8188
	Average yearly income	77	6.4212	0.1970	5.8761	6.8855
	Average employee age	77	3.6595	0.0690	3.3945	3.7955
	Age of the firm	77	4.1607	0.4964	0.6931	4.7449
	BHAR	73	0.1922	0.4431	–0.6824	1.6820
	Market capitalization2	73	25.6370	1.2884	23.2902	29.0419
	Profit rate in 2003	73	0.0451	0.0411	–0.0111	0.1828

Note: LEA indicates the legal disability employment rate achievement. With the exception of CAR, variance estimate, LEA dummy, and BHAR, we used the log values of all the remaining variables. Moreover, I carried out BHAR after processing the abnormal value. Here, abnormal value refers to the data that deviated more than four times the standard deviation from the mean. Market capitalization1 indicates the market capitalization at the end of June 2003, while market capitalization2 shows the mean of 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 4-2. Descriptive statistics of the variables used to analyze the impact of disability employment information disclosure (non-manufacturing)

Groups	Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Tokyo small and medium	CAR	192	–0.0058	0.0866	–0.3315	0.4758
	Variance estimate	192	0.0009	0.0008	0.0001	0.0068
	LEA dummy	192	0.4375	0.4974	0.0000	1.0000
	Market capitalization1	192	23.9091	1.2562	21.6858	28.7283
	Number of employees	192	5.7930	0.8505	1.6094	6.8987
	Average yearly income	192	6.3454	0.3865	3.2426	8.4968
	Average employee age	192	3.5810	0.1252	3.2426	3.8133
	Age of the firm	192	3.6969	0.6688	0.0000	4.7791
	BHAR	184	0.3516	0.7337	–1.2235	2.9699
	Market capitalization2	184	24.0949	1.2309	22.0895	28.7577
	Profit rate in 2003	184	0.0458	0.0544	–0.0870	0.2574
Tokyo large	CAR	216	–0.0120	0.0725	–0.2995	0.2781
	Variance estimate	216	0.0010	0.0039	0.0001	0.0571
	LEA dummy	216	0.2917	0.4556	0.0000	1.0000
	Market capitalization1	216	25.0370	1.4924	22.3733	30.1996
	Number of employees	216	7.9191	0.7996	6.9088	11.5138
	Average yearly income	216	6.4274	0.3528	3.4563	7.2910
	Average employee age	216	3.6088	0.1121	3.2347	3.9040
	Age of the firm	216	3.8529	0.5482	0.0000	4.8978
	BHAR	197	0.2631	0.6214	–0.8863	2.9695
	Market capitalization2	197	25.2634	1.5001	22.3215	30.0660
	Profit rate in 2003	197	0.0398	0.0477	–0.0482	0.2677
Osaka	CAR	43	–0.0087	0.0986	–0.3938	0.3230
	Variance estimate	43	0.0007	0.0008	0.0001	0.0035
	LEA dummy	43	0.4419	0.5025	0.0000	1.0000
	Market capitalization1	43	24.9691	1.3147	23.0090	28.2317
	Number of employees	43	8.0753	0.9485	6.9246	10.4779
	Average yearly income	43	6.3708	0.2741	5.6958	6.9363
	Average employee age	43	3.5946	0.1087	3.3358	3.8177
	Age of the firm	43	3.9721	0.4475	2.7726	4.6634
	BHAR	41	0.1864	0.4712	–0.6252	1.4885
	Market capitalization2	41	25.09383	1.317445	23.15778	28.25647
	Profit rate in 2003	41	0.0312	0.0287	–0.0153	0.1296

Note: LEA indicates the legal disability employment rate achievement. With the exception of CAR, variance estimate, LEA dummy, and BHAR, I used the log-values of all the remaining variables and carried out BHAR after processing the abnormal value. Here, abnormal value refers to the data that deviated more than four times the standard deviation from the mean. Market capitalization1 indicates the market capitalization at the end of June 2003, while market capitalization2 shows the mean market capitalization between June 2003 and June 2004. The unit for the average yearly income, market capitalization1, and market capitalization2 is 1,000,000 yen.

Table 5-1. Estimation results of the short-term analysis (manufacturing)

Dependent variable CAR	Tokyo small and medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	WLS	TSLS	WLS	TSLS	WLS	TSLS
LEA dummy	−0.0259	−0.2081***	0.0010	−0.3261***	−0.0628*	−0.0181
	(0.0172)	(0.0515)	(0.0161)	(0.1268)	(0.0370)	(0.0616)
Market Cap.1	0.0238**	0.0235**	0.0063	0.0162*	−0.0091	−0.0176
	(0.0094)	(0.0118)	(0.0053)	(0.0092)	(0.0153)	(0.0173)
DWH		26.9767***		18.9409***		0.7826
Sargan statistic		Yes		Yes		Yes
First-stage f		7.61***		2.52**		7.00***
First-stage probit estimates marginal effect						
Dependent variable R						
Full-time employees	−0.2135***	−0.2140***	0.0303	−0.1048**	0.4094***	0.3805**
	(0.0619)	(0.0620)	(0.0331)	(0.0521)	(0.1495)	(0.1819)
Average yearly income	0.4701*	0.4629	−0.3763*	−0.6269***	1.5904*	1.4517
	(0.2798)	(0.2897)	(0.1974)	(0.2086)	(0.7418)	(0.8891)
Average employee age	0.8463	0.8735	−0.2801	0.2704	−0.0698	0.1172
	(0.7241)	(0.7792)	(0.4166)	(0.4392)	(1.3379)	(1.4970)
Age of the firm	−0.1461	−0.1465	0.0286	0.0260	0.8304**	0.8365**
	(0.1846)	(0.1848)	(0.0920)	(0.0941)	(0.3568)	(0.3596)
Market Cap.1		0.0052		0.1213***		0.0361
		(0.0545)		(0.0362)		(0.1305)
Pseudo R-squared	0.1865	0.1865	0.0772	0.1160	0.4752	0.4759
Log-likelihood value	−90.359	−90.355	−135.375	−129.6931	−27.4330	−27.3945
Number of observations	161	161	258	258	77	77

Note: Standard errors are in parentheses under the regression coefficients. ***, **, and * denote significance at 1%, 5%, and 10%, respectively, for the two-sided test. Regarding the first-stage f, 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 results of the over-identifying restrictions test. LEA indicates the legal disability employment rate achievement, and Market Cap.1 indicates market capitalization1.The independent variables used in the probit estimation are expressed in their logarithmic form. For coping with the weak instruments, see footnote 28.

Table5-2. Estimation results of the short-term analysis (non-manufacturing)

Dependent variable CAR	Tokyo small and medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	WLS	TSLS	WLS	TSLS	WLS	TSLS
LEA dummy	−0.0253*	−0.0306	0.0343*	0.2588**	−0.0416	−0.1800
	(0.0140)	(0.0344)	(0.0178)	(0.1045)	(0.0756)	(0.2124)
Market Cap.1	0.0056	0.0060	−0.0052	−0.0197*	−0.0148	−0.0100
	(0.0061)	(0.0062)	(0.0062)	(0.0104)	(0.0323)	(0.0309)
DWH		0.0280		8.6647***		0.5237
Sargan statistic		No		No		No
First-stage f		8.19***		2.56**		0.96
First-stage probit estimates marginal effect						
Dependent variable R						
Full-time employees	−0.1957***	−0.1913***	0.0444	0.0214	0.1014	−0.1594
	(0.0577)	(0.0583)	(0.0410)	(0.0513)	(0.1104)	(0.2110)
Average yearly income	0.0123	−0.0249	−0.0141	−0.0472	0.8802	0.6737
	(0.1143)	(0.1222)	(0.1219)	(0.1253)	(0.5322)	(0.5668)
Average employee age	0.8695*	0.9158*	0.3360	0.3525	−0.7853	−0.2649
	(0.4771)	(0.4812)	(0.4105)	(0.4101)	(1.2388)	(1.3478)
Age of the firm	−0.2107**	−0.2025**	−0.1192	0.3525	0.1365	0.0365
	(0.1028)	(0.1033)	(0.0782)	(0.4101)	(0.2530)	(0.2750)
Market Cap.1		0.0430		0.0232		0.2236
		(0.0399)		(0.0312)		(0.1541)
Pseudo R-squared	0.1320	0.1364	0.0677	0.0698	0.2195	0.2565
Log-likelihood value	−114.218	−113.6284	−121.559	−121.285	−23.0342	−21.9428
Number of observations	192	192	216	216	43	43

Note: Standard errors are in parentheses under the regression coefficients. ***, **, and * denote significance at 1%, 5%, and 10%, respectively, for the two-sided test. Regarding the first-stage f, 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 results of the over-identifying restrictions test. LEA indicates the legal disability employment rate achievement, and Market Cap.1 indicates market capitalization1.The independent variables used in the probit estimation are expressed using their logarithmic values. For coping with the weak instruments, see footnote 28.

Table 6. Estimation results of the long-term analysis

	Tokyo small and medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)
Manufacturing						
LEA dummy	0.1331	0.1625	0.2358***	−0.1634	0.1172	0.4920
	(0.1130)	(0.3353)	(0.0891)	(0.3388)	(0.1260)	(0.3650)
Profit rate in 2003	−0.3380*	−0.3293	−1.2411*	−1.2264*	−0.4783	0.6253
	(0.2028)	(0.2132)	(0.7019)	(0.7233)	(1.7677)	(2.1736)
DWH		0.028		4.419**		1.853
Hansen J statistic		Yes		Yes		Yes
First-stage f		3.14**		3.29**		4.25***
Number of observations	156	156	246	246	73	73
Non-manufacturing						
LEA dummy	−0.1000	0.2386	0.043	1.7931	−0.1408	−0.7288
	(0.1045)	(0.3549)	(0.0928)	(1.8351)	(0.1751)	(0.6535)
Profit rate in 2003	−3.0037***	−2.7731***	−1.5754**	−2.7854	−3.6257	−6.1909
	(1.0484)	(1.0034)	(0.7506)	(2.0945)	(3.5646)	(4.6038)
DWH		0.167		4.789**		0.963
Hansen J statistic		Yes		Yes		No
First-stage f		6.43***		0.32		0.45
Number of observations	184	184	197	197	41	41

Note: Standard errors are in parentheses under the regression coefficients. ***, **, and * denote significance at 1%, 5%, and 10%, respectively, for the two-sided test. Regarding the first stage f, the coefficient of all instrumental variables shows the value of the null hypothesis of 0 with estimation model (3). DWH indicates the Durbin-Wu-Hausman test, and the Hansen J statistic shows the over-identifying restrictions test results. LEA indicates the legal disability employment rate achievement. For coping with the weak instruments, see footnote 28.