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An evaluation of the disability employment policy with respect to the quota-levy system in Japan[1]

—Evidence from a natural experiment on stock prices—

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Abstract

The disability employment policies in Japan are characterized by the quota-levy system and aim to equalize the cost associated with disability employment for each firm. This paper attempts to test the ramifications of the information disclosure regarding each firm's rate of disability employment by using data from natural experiments conducted in Tokyo and Osaka in 2003. In concrete terms, after the disclosure of the above information, this paper verified the difference between the stock-price changes observed in the two groups: the firms employing fewer disabled employees than legally required and those satisfying the standards set by the instrumental variable (IV) estimation. At the same time, we also verified whether the efficient market hypothesis holds with respect to the information disclosure. In addition to this, we estimated the cross-sectional relationship between the proportion of disabled employees and each firm's profit in 2000, based on the information collected. The estimation results indicate the following: First, the penalty imposed by the Japanese disability employment policies—the public disclosure of the firms' names—is not effective in promoting the employment of the disabled. Second, among small, medium-sized, and manufacturing firms, the proportion of disabled employees required by the law exceeds their optimal levels. Third, the cost of employing the disabled is equalized among neither the manufacturing nor the non-manufacturing firms. Therefore, we need a more inclusive policy assessment of the disability employment policies, especially with regard to the cost aspect.

JEL classification numbers: J14, J29, J70, K31

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

1 Introduction

What will be necessary to promote the general employment of the persons with disabilities?[2] This paper aims to discuss the evils caused by a quota system that accompanies an incomplete subsidy system (quota-levy system). In economics, persons with disabilities are referred to as a "specific population" and defined as those with physical or mental limitations that impede their daily activities or their productivity on the job (Haveman and Wolfe, 2000).

Most major industrial societies implement several government programs in an attempt to ameliorate the consequences of work-limiting health impairments 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, the employment-centered programs play a more central role, because realizing the general employment of persons with disabilities is the ultimate aim in carrying out social participation for them. In recent years, due to developments in medical care and rehabilitation technology, disabled persons using some kind of support can be as productive as nondisabled persons. Therefore, in order to effectively promote the general employment of the disabled, we need an appropriate disability employment policy. In each developed country, such a policy mainly consists of antidiscrimination laws and a quota-levy system, but neither can be called effective in promoting the general employment of the disabled. Furthermore, in relation to income-support measures, developed countries aim to determine an ideal, appropriate employment policy (Burkhauser and Dary, 2002; OECD, 2003; Thornton, 1998).

The antidiscrimination law was instituted based on the norm that the human rights of disabled persons should be guaranteed. This law requires employers to offer reasonable working conditions, such as a barrier-free workplace environment, to their disabled employees and outlaws discrimination against the disabled with respect to recruitment, payment, and dismissal. Under this law, the rights of disabled persons are guaranteed, and they cannot be treated differentially (Jones, 2006). Therefore, this law can secure a

[2] The disabled are provided employment through a special welfare system for those who wish to start work. This is because the mainstream employment system is heavily biased against the limited abilities of the handicapped, and regular kind of work is difficult for them. For persons employed in rehabilitation institutions, social participation occurs concurrently with rehabilitation for vocational aid. Moreover, the labor law is not applicable to this employment system. In this paper, the term "general employment" is used to contrast with work obtained through the special welfare system that assists those who wish to find work. Therefore, general employment implies "regular" or "usual" employment.

certain quality of employment for disabled workers. However, the company is required to provide its disabled jobseekers and employees with reasonable facilities at its own expense. In other words, the antidiscrimination law does not possess a function to compensate the firm that bears the expense burden of employing disabled persons. Despite this, in countries that have adopted such a law, it is claimed that there are no negative repercussions associated with employing the disabled (Acemoglu and Angrist, 2001; Burkhauser et al., 2007; Jones, 2005).

On the other hand, the quota-levy system was initiated under the notion that protecting disabled persons, who are socially vulnerable, is a social duty. This system requires firms to employ a fixed number of disabled persons, and the government collects levies from firms that do not achieve the legal employment rate. These levies are contributed to rehabilitation foundations for promoting the general employment of disabled persons. In other words, the levies form the funds or source of revenue to provide not only the necessary rehabilitation for general employment but also the employment subsidies for companies who employ the disabled. Furthermore, the firms that achieve the legal employment rate also receive grants.

Under this system, companies that fail to follow the above measures are penalized with the publication of their names, but this does not guarantee the rights of the disabled. Therefore, as in the pure quota system, it is quite possible that the quality of employment of the disabled workers is not secured (Holzer and Newmark, 1999). However, the quota-levy system aims to equalize the cost associated with employing the disabled in each firm. Therefore, this system does consider the burden borne by firms that employ disabled workers. In addition, preceding studies on this issue in Japan have pointed out that this system has been effective, and its abolition would lead to an increase in unemployment among the disabled, with a corresponding increase in the public expenditure on welfare payment (Nakajima et al., 2006). It is generally believed that disability employment measures should be central to all the policies regarding the disabled, and many countries have adopted the quota-levy system. However, this study aims to explain why the quota-levy system would be ineffective in promoting the general employment of persons with disabilities and stresses the need to determine a more appropriate disability employment policy.[3, 4]

[3] The quota-levy system is an old system, and many countries have adopted it. However, the form of the system and the nature of the levies are different, depending on the cultural context of each country. Note that this paper only addresses the system practiced in Japan.

[4] Nakajima et al. (2006) theoretically formulated the quota-levy system in Japan, set the social revenue and expenditure incurred when public assistance provision is added to this system as the evaluation function, and attempted a simulation analysis. They pointed out that although this system is somewhat effective, there is a lot of room for improvement because social revenue and

Preceding studies have shown that the expense burdens of the employing forms should be reduced, in order to promote the employment of disabled persons. From this point of view, the quota-levy system is more desirable than the antidiscrimination laws. However, in order to effectively promote disability employment under this system, it is necessary for the expense burdens of all firms to be made equal. Since firms are heterogeneous, some companies can employ disabled persons with little expenditure, while others have to bear forbidding expenses. If such heterogeneity is not considered, the latter type of companies end up bearing huge financial burdens to this end—that is, employing sufficient disabled persons in order to achieve the legal employment rate becomes a very expensive proposition. At such a time, if the penal regulations mentioned earlier are not effective, the companies end up shirking their legal employment duties. If such companies increase in number, the aims of disability employment will remain unachieved.

The main purpose of this paper is to clarify whether the expense burden borne by all the companies is equal and the penal regulation step is effective. In other words, this paper evaluates the objectives of the quota-levy system, using a natural experiment in which the disability employment situation of individual firms was disclosed. In Japan, only the aggregated macro data regarding the employment of disabled persons has been conventionally published. However, in 2003, a private NPO released individual firms' data on the disabled workers' employment situations. In this paper, we conducted a virtual experiment to test "What would be the consequences if a firm achieved the legal employment rate." For this, we utilized the results from this natural experiment in two steps. First, we confirmed the relationship between the firm's profit and disability employment in 2000, when the information was collected. Second, we used the respective data on stock prices and checked how the information released during the natural experiment in 2003 impacted the true value of the firm.

The results indicate the following. First, we cannot deny that the imposition of penal regulations has been ineffective. Second, in the manufacturing industry and medium- and small-sized firms, the number of disabled employees required to achieve the legal employment rate exceed the optimum level for such companies. Third, the expense burden of firms employing the disabled is not equal for manufacturing and non-manufacturing firms. In this way, 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. In section 2, we have explained the Japanese

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expenditure would deteriorate if this system were abolished.

disability employment policy and its economic problems; following this, we have described the information disclosure process. In section 3, we have explained the design of the analysis. Further on, in section 4, we have presented the estimation strategy and used it to check the validity of the instrumental variables. The data sources have been provided in section 5 and our interpretation of the estimation results is presented in section 6. Section 7 contains the concluding remarks.

2 Background and the natural experiment

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 workers at a constant rate of regular employees. Moreover, in the case of companies with over 301 employees that fail to meet the legal employment rate for disabled employees, the authorities can levy a fine of 50,000 yen per shortfall in disabled employment. The money collected is pooled into the rehabilitation foundation, and this is chiefly used to provide employment subsidies and grants to aid disability employment so that companies achieve the legal employment rate. The grants amount to 21,000 yen per excess number of disabled workers in firms with over 301 employees and 27,000 yen to firms with less than 300 employees.[5] When entrepreneurs are unable to furnish sufficient reasons for not achieving the legal employment rate, they are commanded to adopt "the disability employment plan" as suggested by the Ministry of Health, Labor and Welfare. Entrepreneurs who fail to adopt this plan are imposed a penalty payment of up to 200,000 yen. Furthermore, for companies that continue to fall short of the required level of disability employment, the ultimate penal regulation measure—public announcement of the company's name—is carried out.[6]

This system is aimed 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 for employing persons with disabilities.[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

[5] Both are the current figures for 2007. However, they are scarcely different from the figures for 2000.
[6] Article 47 on the Law for the Employment Promotion, etc., of the Disabled.
[7] For the quota-levy systems adopted across the world, see Thornton (1998).

investment. Therefore, if an individual company bears this expense, its financial burden will be excessive, which will result in an imbalance. Therefore, in order to promote disability employment, all firms need to share the expenses."[8]

The biggest drawback of the antidiscrimination law is that it provides no compensation for the expense incurred by firms that adopt disability employment. In this case, the precedent study shows that the disability employment objectives have not been achieved. The quota-levy system in Japan is concerned with the expenses borne by a company due to disability employment. Therefore, in order 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 burdens borne by all types of companies. However, the 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 transition of the legal employment rate and the underachievement company ratio dating from the foundation of the system in 2002.[9] The dotted line shows the group of companies with over 1,000 employees, which have been unable to meet the disability employment target. Although this ratio has temporarily risen due to the increase in the legal employment rate, overall there appears to be a gradual tendency to decline. However, in 2002, it is still a little more than 70%. In addition, the solid line shows the transition of wholly private enterprises, which shows a rising trend; this indicates that the ratio of companies that have not achieved the legal employment rate has increased in recent years.

According to the Survey on the Actual Status of Physically Disabled Children/Persons (Ministry of Health, Labour and Welfare, 2003), The one for no

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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 enterprises failing to achieve the employment quota, and offering grants to those enterprises employing many physically disabled persons … Because the employment of physically disabled and mentally retarded persons imposes a costly financial burden, such as the expense of modifying working facilities and equipment, special employment management and so on, an imbalance exists between enterprises which 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).

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

employed to hope for starting work goes up to 70.2%.[10] On the other hand, the ratios of people who are unable to find employment are about 15% for a woman in her thirties and 15% to 20% for senior citizens.[11] This indicates that in comparison with other so-called minority groups in Japan, the ratio of unemployed handicapped persons with the ability to work is extremely high. Therefore, Figure 1 shows a continuing situation in which disabled persons with both the will and ability to work do not find employment. This is obviously not a satisfactory situation from the viewpoint of ensuring an optimum level of general employment of the disabled. This is because many companies refrain from employing workers with disabilities.

In the international scenario, the emission trading mechanism is similar to the Japanese quota-levy system. This scenario sets the upper limit for the greenhouse gas emissions discharged by each country, and various countries can trade in carbon rights for a price. By allowing this trade in carbon rights, this system aims to minimize reduction expense all over the world. Since the carbon rights come at a fixed price, countries that find reduction expenses to be excessively high can sell their carbon rights, while others that do not face too much reduction expenses can buy them. Therefore, each country can increase its gain only by reducing emission within its territory. Under this rule, the price determined by competitive equilibrium becomes the price of minimizing the total reduction expense of greenhouse gases.[12]

Now let us review the quota-levy system imposed on firms with respect to disability employment. 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 the companies that do not achieve the legal employment rate and distribute most of the revenue collected to the companies that have 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 the company burdens will be equalized. In order to promote disability employment throughout Japan, it is necessary to set the legal employment rate in such a way as to include the labor force of working-age disabled workers who have the ability to work, along with setting a price for a company's right not to employ the disabled. In

[10] This number include it for under medical treatment and the housework entering school and who have the occupation experience because there are some disabled who cannot work inherently.

[11] The data regarding senior citizens are from the "Survey of Working Conditions of Advanced Aged Workers" (Ministry of Health, Labour and Welfare, 2004) and those regarding women in their thirties are from the "Work Force Survey" (Ministry of Internal Affairs and Communications, 2002).

[12] For the basic model of emission trading, see Xepapadeas (1997).

such a case, companies that find it overly expensive to employ disabled persons can buy the right not to employ a disabled person from companies that do not incur much expenditure over such employment. In this way, each group stands to gain by employing the disabled. As in the case of emission trading, under such a rule, the price determined by competitive equilibrium becomes the price of minimizing the cost incurred by all the firms in Japan, which will promote disability employment.

2.2. Process of information disclosure

For a long time in Japan, only aggregated macro data regarding disability employment were available, due to which there have been rare instances of economic studies on the disability employment policy. However, the disability employment situation of individual companies in Tokyo and Osaka was publicly disclosed in 2003. The process of this disclosure was as follows.

In 1999, a private NPO and stockholder of a company named Japan Airlines Corporation (JAL) claimed compensation for damages from JAL and asked for the imposition of delinquency charges on the manager of JAL "because the manager of this company did not positively employ disabled persons, a large sum was paid as levy, and this had resulted in damage to this company"; this case was brought before the Tokyo District Court.[13] The plaintiff insisted this enterprise was repeatedly apathetic to disability employment and thereafter filed a similar case against Sony. Along with some other NPOs interested in the disability problem, this organization further called for the publication of the disability employment situation of individual firms under the purview of each Bureau of Labor in Tokyo and Osaka. However, the above Bureaus of Labor had decided not to publish this information. The primary reason for this was the penal regulation measure of publicly announcing the defaulting company's name under the disability employment policy acts as social sanctions to the defaulting enterprises. Therefore, the publication must include a description of the obstacles faced during the appropriate accomplishment and management of the disability employment policy. Secondly, with the corporate name and its problems made public, people might connect the company activities with a social evaluation of the enterprise, which would lower their social credit and impair honest profits.[14]

[13] Regarding this case, the Tokyo District Court settled the Japan Airlines shareholder lawsuit (JAL suit) by causing a reconciliation between the two parties on May 17, 2001. The terms of the reconciliation are as follows: JAL was ordered to "change the disability employment rate from 1.29% to 1.49%, which was the national average in 2003, and subsequently to 1.8%, which is legally required by 2010. Meanwhile, JAL is mandated to announce their achievement rate on their home page."

[14] Extracted from the home page of "the DPI Japan meeting" (http://www.dpi-japan.org/3issues/3-6-

In May 2001, the above private NPO filed a suit for disability employment information disclosure regarding individual companies from each labor bureau and, at the same time, submitted an "information disclosure query" regarding the bureaus' correspondence with the government. The information disclosure examination committee received the statement of the query, based on the Administrative Appeal Law, for the Minister of Health, Labor and Welfare and prepared a report which contained an almost full-scale disclosure, as follows: "Regarding the list of companies that have not achieved the employment rate, the company names should be disclosed, with the exception of the disability classification. Moreover, regarding the enforcement situation report of the disabled persons' employment plan, the number of disabled persons required to achieve the target employment, the situation of the employment, and the enforcement situation of the plan should be disclosed, excluding the company's name." The Minister of Health, Labour and Welfare received this report on December 9, 2001, and decided to implement it.[15] As a result, the disability employment situation of the enterprises under the jurisdiction of each bureau, as of 2000, was published in Tokyo on October 8, 2003, and in Osaka on September 8, 2003. The disclosed company characteristic was different in each bureau. In Tokyo the companies who had not achieved the legal employment rate was published and in Osaka the companies whose employees is 1,000 or more regardless of the achievement of the legal employment rate was published. The private NPOs that obtained the disclosure of this information published it on their own home page. In Japan, there were very few cases of such information disclosure concerning the employment of the disabled before this experiment, and this was just the first step leading to a much more large-scale disclosure.[16] Since this event occurred accidentally in the beginning, it can be regarded as a natural experiment.

3 The design of the analysis

In this paper, by using the natural experiment in 2003 and estimating the impact of the information disclosure on the stock prices, we explored what would happen in a

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[15] Extracted from the contents of the report regarding the partial disclosure of the job situation of handicapped persons

[16] From 1977 to 2003, the names of only four companies had been announced, but even these announcements were not part of the penal regulations step. Moreover, they were all small businesses.

virtual scenario wherein each enterprise had managed to achieve the legal employment rate. Our evaluation was based on information collected in 2000. If the rational expectations and efficient market hypotheses hold, the public information, except that regarding the disability employment situation, would be reflected in the stock prices.

What would be the effect of this kind of information disclosure on stock prices? In order to determine this, we should enumerate some factors affecting stock price changes. The first factor is the investor's evaluation of the company's corporate social responsibility. By 2003 in Japan, socially responsible investments were made in companies that tended to practice corporate social responsibility. If investors consider disability employment to be part of a company's social responsibility, the stock prices of companies that do not achieve the legal employment rate may fall.[17] This point has been clarified by Nagae (2005), who applied the event study methodology to the Osaka samples and tested the short-term changes in stock prices resulting from the information disclosure. The results indicated that while the stock prices of firms that achieved the legal employment rate fell, those of the defaulters rose. Moreover, these differences were statistically significant. Based on this, Nagae has pointed out the possibility that the penal regulations measure of publishing the defaulting company's name is not effective. In addition, the above scenario suggests that investors may not evaluate a company on the basis of its corporate social responsibility.

The second factor concerns the expense burden borne by the company in order to comply with disability employment. Whether the firm fulfills its obligatory legal rate of disability employment depends on its manager's opinion of the firm's employment obligation and what he or she thinks of the penal regulation measure of publicly announcing the company's name. As was already noted, under the quota-levy system in Japan, it is very likely that the company burdens will be unequal. 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 an abovementioned type of company considers disability employment to be its duty, then the expense burden on such a company will be regarded as impeding profit maximization. Conversely, a company that does not need much expenditure to employ disabled persons can easily achieve the legal employment rate and avail of grants. As in the former case, if the latter types of companies are unable to achieve the legal employment rate, they are regarded as failing to perform profit maximization. This situation should influence the decision-making of the investor.

[17] In America, the equity value of firms charged with violating equal employment opportunity laws falls whenever a suit, decision, or settlement is announced (Hersch, 1991).

The third factor has to do with awareness regarding social discrimination against disabled persons. If society is convinced that persons with disabilities have low productivity, the stock prices of enterprises employing a significant number of disabled persons might fall.

In this paper, we have focused on the second and third possibilities. First, I divided the sample companies into two groups—those who achieved the legal employment rate and those who failed to achieve it. Then, I estimated the change in normal stock prices before the information disclosure and thereafter inspected the differences in the stock prices changes for both the 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 expenditures for employing disabled persons. If such expenditure influences corporate performance, whether or not the legal employment rate is achieved, the investor decision will have endogeneity due to the variable of corporate performance. Therefore, we need instrumental variables such as the scale of employment in the past, which is highly likely to affect the disability employment but not likely to influence the decision-making of the investor. Following this, in order to determine whether the firms with each attribute are performing profit maximization and in order to confirm the validity of the instrumental variables, I investigated the relationship between each firm's level of disability employment and profit in 2000, for which the disclosure information was collected.

Next, in order to confirm whether or not the third factor has any influence on the above, I analyzed the long-term excess returns of the 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 true. If society is convinced that disabled workers have 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 are sure to show positive long-term excess returns, despite the negative short-term stock price reaction[18]. In this paper, by performing a long-term analysis, I have confirmed that there would be no such anomaly as described above.

The investor foresees the future earnings of the enterprise and decides his or her present stock trading. There is no anomaly, and when the endogeneity and heterogeneity of each firm are controlled, the difference in stock price changes after the information

[18] 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 prices data.

disclosure indicates “what will happen if a company achieves the legal employment rate.”

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

4.1. Estimation strategy

In this section, I have explained the estimation strategy used to inspect the impact of the information disclosure in 2003 on the stock prices. To begin with, we will assume that the rational expectation hypothesis holds. Then, we will use the following estimation models to analyze the reaction of the 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 subsequently defined. R is the dummy variable that indicates whether the firm has achieved the legal employment rate—this takes the value of 1 if the firm achieves the legal employment level and 0 if it does not. ε is the error term, and $\mathbf{X}$ represents the control variable matrix, which is unrelated to the information disclosure but nevertheless affects the 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 companies and the average (cumulative) abnormal return of the achieving companies. Hence, this parameter becomes the index indicating what would happen if a company achieved the legal employment rate. Using this formulation, we can eliminate the macro shock experienced by the entire sample and measure the pure effect of the event.

Following this, let us consider the influence of corporate performance. The variable indicating whether or not the firm benefits by achieving the legal employment rate has endogeneity because this allows us to consider two possibilities based on which the information disclosure may influence the stock prices. The first possibility indicates a direct influence of information disclosure regarding the disability employment situation

on stock prices. According to the second possibility, corporate performance is seen in the light of some company attributes that strongly relate to the employment of the disabled, and any impact on the corporate performance is reflected in the stock prices. When R 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) estimates. In the first step, we use **X** and the instrumental variable **Z** that influences disability employment but not the investors' decision-making; these variables are assumed to be independent, and OLS generates the following estimation models.

$$R_i = \alpha_0 + \mathbf{Z}_i\boldsymbol{\alpha}_1 + \mathbf{X}_i\boldsymbol{\alpha}_2 + u_i \quad (2)$$

In order to control the influence of the scale of each equity in the stock market and any industry-related event that is unrelated to the information disclosure, we can use the industrial dummy variables and the market capitalization toward the end of June 2003 for the short-term control variables and the industrial dummy variables and the mean value of the market capitalization from June 2003 to June 2004 for the long-term control variables. In addition, the long-term dependent variable, which will be explained in the following section, does not consider the individual stock attributes of the information disclosure at that point in time. Therefore, I have used the profit rate (ordinary 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 event study methodology as a dependent variable.[19] The 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 to the expected rate of change had the event not taken place. It is a technique of testing the impact of the event by analyzing the deviation. There is no established methodology for this technique, but normally, many researchers use a two-step estimation method, which can be explained as follows.[20]

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[19] This methodology is frequently used in corporate policy decision-making (Kothari et al., 2007).

[20] This explanation is based on that provided by Mackinlay (1997) and Campbell et al.

First, we define the event in which we are interested. This is to specify the time when the investors obtain information regarding the event. In general, the investor does not necessarily know about the event's occurrence on the very day of its occurrence; even if the investor is 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).[21]

(Figure 2)

After defining the event, we estimate what would be the stock market earning rate during the event period if the event had 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 of the Tokyo Stock Price Index [TOPIX] in this article) as a criterion for calculating 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 the stock prices due to the event's occurrence. First, the period during which the 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 from this analysis helps explain the normal stock prices change 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 earning ratio forecast from the estimation period and

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(1997).

[21] If we want to inspect whether the influence of the event is sustained, consider the last part of the event to be denoted by (L_3).

the price earning ratio 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 of 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. Now, as shown in Figure 2, time is assumed to be τ; the first day of the estimate period is assumed to be T_0; its last day, T_1; and the last day of the event period is assumed to be T_2. Therefore, the estimate 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 the 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

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

It is necessary to obtain the excess return index for the entire event period in order to determine its influence on stock prices. The value of the excess returns on each day of the event period accumulated over the entire period is used for 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 estimate value of the variance of the CAR is derived by adding (5) to the event period.

Setting the estimation and the event period

Some drawbacks of the event study method have been pointed out. First, the investors' expectations from the information on the event may not be the same (Card and Krueger, 1997).[22] That is, the investors might have different expectations regarding the manner in which disability employment influences corporate performance based on the corporate attributes. Second, it is difficult to capture the timing of the event. If the information regarding the said event is already well known, the investors' 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.

In this paper, I dealt with the above problem as follows. First, I divided the sample into groups according to the employee scale, industry, and regional attributes, and by using the window after the event (L_3), I checked whether the information impact on stock prices had continued.[23] By doing so, I was able to verify whether the investors have equal expectations from each group. Second, the event day is 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 homepages of the "Shareholder ombudsman" and "DPI Japan conference," respectively.[24] Then, I 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 this variety of estimation and event periods, I selected the most typical periods. Thereafter, considering that the investors reacted to the information disclosure, I identified the respective estimation and event periods during which this typical pattern was shown.[25] 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.

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

[23] I selected 11days window from day +1 to day +11 from the event.

[24] I performed the analysis by assuming the days on which the information was disclosed by the Osaka and Tokyo labor bureaus as the event days. However, I was unable to obtain a unified interpretation of these two events.

[25] If needed, I can include details regarding this analysis.

4.2.2. Long-term dependent variable

For the long-term analysis, I 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.[26]

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

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

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

I would like to confirm the relationship between the short-term and long-term excess returns mentioned above. Figure 3 shows the excess return transition in the form of a solid line arrow. On the day of the event (S), the information reaches the public. At this time, there are three kinds of possibilities with respect to the transition of a short-term excess return from T_0 to T_1—it will either rise or fall or remain constant. Let us first consider the first two possibilities. After the rise (or fall) of the short-term excess return, if there is no long-term influence of the information, the transition of the long-term excess return becomes constant (i.e., the efficient market hypothesis holds (E1)、(E2)). In the event of an anomaly, the transition of 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. Selection of the instrumental variable

In order to determine whether achieving the legal employment rate is good or bad for a company, we need to see if its attributes and human resource management have a strong influence on the company. These factors strongly correlate with R for the estimation models (1) and (2). However, these are predetermined variables that have

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

been decided before the information disclosure and therefore cannot be regarded as determinant factors of the stock price change. Therefore, they become candidates of the instrumental variables $\mathbf{Z}$.

The candidates of the instrumental variables are, to begin with, the number of employees. The quota-levy system is a type of quota system, and the firm is expected to employ a fixed percentage of disabled persons. However, it is very rarely the case that the legal employment rate corresponds with the optimum number of disabled employees for a firm. Since the quota-levy system in Japan is designed in such a way that the burden rates differ depending on the employee scale, whether it is beneficial or not for a company to achieve the legal employment rate will also strongly depend on its employee scale.[27]

Second, the time of the company's establishment influences its disability employment compliance. Since the issue of specific populations attracts considerable social interest, it is very likely that the employment of disabled persons in a private firm is strongly influenced by social trends. For instance, when the quota-levy system began in Japan, the newspapers constantly focused and criticized the banking industry's non-compliance with the legal employment rate requirement, although it was believed to be difficult to achieve the legal employment rate of 1.5% at that time.[28, 29] In addition, the big enterprises that successively achieved the legal employment rate in the first half of the 1980s made news[30]. These things 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 worked out for the companies. Moreover, such

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

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

[29] We can regard this criticism as applicable to the entire regulation industry of this country. Under such a 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 that could take the lead in achieving the required rate of employment, along with obtaining civilians' consent (Tezuka, 1999).

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

companies would also have adequate know-how regarding the employment of the disabled.

Third, the human resource management of the firm influences its employment patterns. With many of the big Japanese companies, rapid aging is a concern. Among the full-time workers working in big companies, that is, companies with more than 1,000 employees, the percentage of employees who are 45 years old or older has rapidly risen from 31% in 1990 to 36% in 1998 (Genta, 2001). Since it is common knowledge that most of the disabled employees in a private enterprise are partially disabled persons who suffered a handicap during the period of employment itself, 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 hold, past public information does not influence stock prices. Therefore, the values of the above-mentioned instrumental variables are expressed in terms of their logarithms and are entirely based on the data collected from individual companies in 2000, which was the year of the information disclosure.

4.3.2. The confirmation of the disability employment in 2000 and its relation to the company economic profit

In this subsection, we will inspect the relation between the employment of the disabled and company profit at the time of data collection pertaining to the disclosure. The reasons for this are as follows: One, we need not use the instrumental variable method if the employment of disabled persons is unrelated to corporate performances; therefore, it is important to confirm the validity of using the TSLS. Two, by clarifying the relation between disability employment and corporate performance, we can estimate whether the firm is achieving profit maximization.

In this paper, I have employed an estimation model to evaluate the short-term implications of the employer discrimination hypothesis propounded by Becker (1972); this estimation model, which was developed by Hellerstein et al. (2002), is called the "market test." This model confirms that the employee attribute ratio and company profit are not correlated if a company manages to perform profit maximization. In this paper, in line with Sano (2005) and Kawaguchi (2007), who verified the employer sex discrimination hypothesis by using the market test in Japan, I 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, I included a fixed assets/total sales ratio, denoted as $capital$ in the regression. The variable D/L is the proportion of disabled employees among the total employees. Debt ratio ($Debt$) is used to control the impact of the debt on the 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 the 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 a peculiar attribute of the firm. The OLS is used as the estimation method, and I have assumed the heterogeneity of the error term using a method explained by White (1980).

4.3.3. Data, descriptive statistics, and the estimation result

Data and descriptive statistics

The home page of the Shareholder ombudsman announced the names of 290 enterprises with 1,000 or more employees (hereafter, referred to as "big firms") that the Osaka Bureau of Labor had made public. The home page of the DPI Japan conference printed the names of 9,012 enterprises that had not achieved the legal employment rate made public by the Tokyo Bureau of Labor. Among them, I have selected this study's samples from the firms that were listed on the first section of the Tokyo Stock Exchange and regarding which there was sufficient data for estimation. Other data used in this study include the information for the year 2000 collected from "Corporate Financial databank" compiled by the Nikkei Economic Electronic Databank System (NEEDS).

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), the distribution of disability employment is as follows: While 71.1% of the disabled workers are employed in the non-manufacturing industries, 28.9% are

employed in manufacturing. This uneven distribution indicates that the corporate burden resulting from the employment of disabled persons is greatly different for both 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 contain descriptive statistics.

(Table1-1, Table1-2)

Estimation results

Table 2 shows the estimation results of estimation model (8). Since the names of only the big firms were released to the public in Osaka, the results are divided into those for firms with less than 999 employees (hereafter referred to as small- and medium-sized firms) and those for the big firms in Tokyo. Note that in Tokyo, only the names of the enterprises that had not achieved the legal 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 big firms in Tokyo, and columns (3) and (6) pertain to the firms in Osaka. Moreover, the results of the enterprises that achieved and of those that did not achieve the legal 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. Though it is possible that the detection power is relatively poor due to the meager number of samples from Osaka, the data suggest that both the legal rate achieving and underachieving enterprises are maximizing their profits. If this estimation is correct, it may not be possible to detect the information disclosure's influence on stock prices.

As noted above from the Tokyo samples, it is evident that underachievement of the legal employment rate with respect to disability employment does not influence the profit of the big manufacturing firms. Therefore, we can say that this group performs profit maximization by not achieving the legal employment 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 big 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, the above results indicate that the optimum number of disabled employees is likely to be different for manufacturing and non-manufacturing businesses.

Based on the analysis in this section, we can confirm that the employment of the disabled relates to firm profit for some groups.[31] Although the corporate earnings, which investors regard as an index for trading equities, are not always same, there is a high possibility that they are linked to company profits. Therefore, it is necessary to perform an instrumental variable estimation. Moreover, though the data described in this section can neither be used to remove the fixed effects nor make the causal relation specific, the lack of correlation between profit and disability employment suggests the possibility that each group in Osaka has managed to perform profit maximization. In addition, there is a likelihood that the burden cost increases when the legal employment rate is achieved, because the ratio of disabled employees does not correlate with profit for the underachieving big manufacturing enterprises in Tokyo. However, in the small and medium-sized manufacturing and the non-manufacturing enterprises in Tokyo, underachievement of the legal employment rate shows the possibility that they are not doing profit maximization.

(Table 2)

5 Data and descriptive statistics

In the following section, I will explain the data used to estimate the impact of information disclosure and provide descriptive statistics regarding my analysis. In addition to the samples mentioned in subsection 4.3., I have used data regarding those firms in Tokyo that achieved the legal 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 in the home page of the DPI Japan conference.[32] Table 3 lists the selected enterprises according to the type of industry and employee scale. From this table, we can see that with respect to the distribution of industries, the ratio of non-manufacturing firms that have managed to achieve the legal employment rate has increased. This is because non-manufacturing firms include industries in which it is easier to employ disabled persons, for example,

[31] When we check the correlation of the variables pertaining to the ordinary income and the proportion of disabled employees, we find significant positive relations in the big businesses of Tokyo and significant negative relations in the Osaka companies that have achieved the legal employment rate. Therefore, the correlation is robust, indicating that in some groups, disability employment is correlated to the firm performance.

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

service, wholesale, and retail industries. Therefore, the samples used in this context are not greatly different across the whole of Japan.[33]

(Table 3)

Stock prices and market capitalization data were obtained from "Nikkei Needs Financial Quest," while financial data was obtained from "Corporate Financial databank" and the "Quarterly Corporate Report."

(Table 4-1, Table 4-2)

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

6 Estimation results

6.1. The short-term results

In this subsection, I will discuss the short-term results. In the event study methodology, the estimated variance value at 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, I have performed an estimation in which CAR is equal to the standard deviation during the estimation period (Mckenzie and McAleer, 1998).

(Table 5-1, Table 5-2)

Tables 5-1 and 5-2 show the results for manufacturing and non-manufacturing businesses obtained by assuming the short-term CAR to be a dependent variable. Columns (1) and (2) show the estimation results for the big 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 big firms in Osaka. Moreover, columns (1), (3), and (5) show the results of the weighted least square (WLS) estimates that control the corporate

[33] See section 4.3.3.

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 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 employment rate achievement in relation to the stock price reaction is really a endogenous variable, (ii) the over-identifying restrictions test, which tests whether all 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.[34] In this paper, I concluded that the instrumental variable was valid, since all these tests cleared it.[35]

First, I would like to describe the results of the manufacturing firms. In each table, I 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 endogeneity bias. While columns (1), (3), and (5) show the results of only the instrumental variables, columns (2), (4), and (6) show the results after adding the control variables. In the small- and medium-sized enterprises in Tokyo, firms with few employees tend to achieve the legal employment rate. Regarding the big firms in Tokyo, since the coefficient of the average annual salary is significantly negative, it is evident that the firms that achieve the legal employment rate are offering lower wages. In contrast, in Osaka, firms with substantial numbers of

[34] The over-identifying restrictions test is usually called Sargan's test. However, in the long-term analysis, I have used the Hansen J test, since I have used White's method (1980) for dealing with heterogeneity. Regarding the similarities between both the tests, see Hayashi (2000).

[35] 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, I have performed limited information maximum likelihood (LIML) estimation for the group wherein the instrumental variables were 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 –0.1706 and the p-value is 0.0214, while in the long-term estimation (Tokyo), the coefficient is –0.2933 and the p-value is 0.4807. However, with respect to the short-term estimation for small-scale manufacturing industries in Tokyo, the coefficient is –0.0575 and the p-value becomes 0.1776. Therefore, I have estimated only the employee scales showing a stable relation with the endogenous variable as the instrumental variable; the coefficient shows –0.2144 and the p-value becomes 0.000. In this way, I have obtained the same results in this paper. In this instance the first-stage F value is 31.00. 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, I have confirmed that the instrumental variable has a high enough reliability. From the above, I 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 paper. For the instrumental variable methodology and the problem of weak instruments and their measurement, in particular, see Murray (2006).

employees are achieving the legal employment rate. Further, the significant positive effect relating to the operational years indicates that the big enterprises that have long addressed the issue of disability employment are achieving the legal employment rate.

Following this, we will check the influence of the stock prices. 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, I would like to describe the results for the non-manufacturing firms. In the small- and medium-sized firms in Tokyo, the employees are few in number, while their average age is high. Moreover, a new firm at its establishment tends to achieve the legal employment rate. Since the average age is high, this group possibly contains several partially disabled employees. However, the attributes of such firms are the least influential among those of the other groups.

Now let is check the influence of the stock prices. Among these groups, since the instrumental variables are invalid, I have used the results of the WLS estimates that control 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 big 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, I wish 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.[36] Columns (1), (3), and (5) show the results of the OLS estimation that assumes heterogeneity in the error term and controls the industry and the corporate scale in the stock market. Columns (2), (4), and (6) show the result of the TSLS estimate that takes into consideration the factor that influences whether the achievement of the legal employment rate is beneficial for the firm.[37]

(Table 6)

Since our data is limited to the large-scale manufacturing firms in Tokyo, the instrumental variables are valid, and the other groups are judged on the basis of the OLS estimation results. The table shows that information disclosure regarding the disability

[36] The results for long-term impact after one year were similar to that after two years.
[37] For the OLS estimation, I assumed heterogeneity and dealt with the error using a method suggested by White (1980).

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 employment rate tends to have a high influence on the firm's long-term equity value; however, the influence is lost when we consider the endogeneity bias (see column (4)).

In the next section, let us see the disclosure impact on the rate of profit. The rates of profit for both groups are significantly negative, which shows a negative short-term impact. However, the large-scale non-manufacturing firms in Tokyo also show a significant negative influence with respect to the profit rate. No such influence is shown in the case of Osaka.

6.3. Summary and interpretation

In this section, we will collect all the obtained results. 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 the stock prices of firms that employ the legally required number of disabled employees. A similar difference was detected as regards 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 seen in any group. The data reveal that the efficient market hypothesis holds; further, there does not appear to be any mistake-based discrimination based on the 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. The rate of profit shows a significant negative effect in the groups showing a significant negative short-term impact on the stock prices. This is because long-term stock returns are strongly influenced by the rate of profit; this shows that stock returns are strongly influenced by profit maximization behavior—a result that is consistent with the short-term estimation results. However, the large-scale non-manufacturing firms in Tokyo show a significant negative influence, which is inconsistent with the short-term estimation results. From the results presented in section 4.3., this group is not found to have any debt; therefore, investors may temporarily judge this group's rate of profit as negative.

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 employment rate rose, while the stock prices of the firms that had achieved the rate fell. This indicates that the penal regulation measure mandated in the Law for

Employment Promotion, etc., of the Disabled, of publicly announcing the underachieving company's name, is ineffective—in fact, the disclosure of such information through this measure might raise the stock prices (Nagae, 2005). This conclusion by Nagae was confirmed in this paper.

A negative impact was detected in the manufacturing sector; in this type of business, if a firm employs more disabled persons than is legally required, the firm incurs considerable expenditure. This is consistent with the estimation results in section 4.3., which suggest that if the firm does not achieve the legal employment rate, its profit negatively or does not correlate with the proportion of disabled employees; in other words, the firm already incurs the cost or performs profit maximization.

Although this provision is now being abolished in phases, the disability employment measures had once contained exclusion rate regulations that reduced the legal employment rate for those businesses that could not easily employ disabled persons. Since many of the manufacturing businesses have to conform to such regulations, it is clear that employing disabled persons would involve higher cost for manufacturing businesses as compared to 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 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. In this case, why was the significance level regarding the impact on stock prices low in Osaka? With regard to the attributes of the firms that achieved the legal 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 concerning the employment of the disabled; moreover, the 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 effect of the abovementioned group of firms cannot be controlled.

Although a negative effect was detected for the small- and medium-sized non-manufacturing firms in Tokyo, a positive effect was detected for the large-scale non-manufacturing firms in Tokyo. The detection power is low due to the meager number of samples 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 big enterprises of Tokyo is possibly because the optimum number of disabled employees in this type of business exceeds the legal employment rate. It is thought that the investors understood the information of the

underachievement of the legal employment rate as signaling that the optimum number of disabled employees was not achieved; that is, the firm had failed to perform profit maximization. As noted above, a substantial number of persons with disabilities are employed in the non-manufacturing business. Many regulation industries are included in this type of business; in the banking industry, in particular, there is a lot of scope for employing the disabled—which has already been pointed out through the social criticism mentioned above. Moreover, many such businesses, although they may be privatized at present, were formerly managed by the government. Since the legal 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 are sure to have sufficient know-how regarding disability employment. Thus, if investors already know of smoothly functioning regulated industries and formerly government-managed companies that employ substantial numbers of disabled workers, they tend to believe that profit maximization involves employing the optimum number of disabled employees in excess of the legal employment rate. The rate of profit exerts a negative influence on the excess return of long-term stock prices. This suggests that the element of the investors' trust in these enterprises should be included as another factor that influences stock price change.

7 Conclusion and Remarks

This paper has revealed some relation between the proportion of disabled employees and the firms' rate of profit in the year 2000, in which the disclosure information was collected; this finding is based on data pertaining to the natural experiments that occurred at Tokyo and Osaka in 2003, when the information regarding each firm's disability employment situation was disclosed. Following this, we conducted a virtual experiment to determine what would happen if enterprises achieved the legal employment rate, using the natural experiment's sample of disclosed companies to estimate the influence of information disclosure on their stock prices. 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 after the information disclosure. 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 after the disclosure. Third, among the large-scale non-manufacturing firms in Tokyo, there is significant positive difference between the two groups of firms with regard to the excess return of short-term stock prices after the event. 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.

The main objectives of the quota-levy system, which seeks to support the disability employment measures in Japan, are to promote disability employment and equalize the company burden accompanying disability employment. The estimation results in this paper suggest the following: First, it is clear that the penal regulations measure is not effective; 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 employment rate; third, the disability employment rate achievement burdens are not equal between the manufacturing and non-manufacturing industries.

In Japan, the problems faced by handicapped persons have increased with the adoption of the Law for Supporting the Independence of Persons with Disabilities, which aims at fostering self-reliance in disabled persons rather than giving them protection. However, in order to ensure that disabled persons lead an independent life, the authorities need to promote the general employment of persons with disabilities. For this reason, it is necessary to amend the present quota-levy system in Japan. As I suggested in section 2, one economically viable solution would be to set a price on the right not to employ disabled persons.[38] However, before introducing such a mechanism, we need to specify the economic cost of disability employment to the firm, in concrete terms, including that for the old large-scale firms that have operated for several years and the non-manufacturing enterprises, etc., which have additional know-how regarding disability employment. In consequence, there is a pressing need for an overall policy assessment of the quota-levy system, including the measures adopted to promote the employment of the disabled.[39]

The persisting problem in this paper is how to control the fixed effect by using the panel data and confirm the results mentioned in subsection 4.3. Moreover, the BHAR

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

[39] This report is consistent the analysis by Nakajima et al. (2006). It is not the purpose of this paper to argue for a desirable policy, an executable remedy, or an immediate increase in the grant; however, in accordance with Nakajima et al. (2006), this paper seeks to encourage innovation in this field.

used in the long-term analysis has not completely captured the stock market risk.[40] Since the necessary data will have to be gathered over the following years, more time is needed to check the robustness of this paper's results, after which we will be able to analyze the equity market risk more thoroughly using the long-term data.

References

-Acemoglu, D., Angrist, J.D., 2001. "Consequences of employment protection? The case of the Americans with the disabilities act." *Journal of Political Economy* 109(5), 915-57.

-Andrews, D.W.K., Moreira, M.J., Stock, J.H., 2006. "Optimal two-sided invariant similar tests for instrumental variables regression." *Econometrica* 74(3), 715-52.

-Becker, G.S., 1972. *The Economics of Discrimination*. University of Chicago Press, 2nd edition.

-Burkhauser, R.V., Daly, M.C., 2002. "Policy watch: U.S. disability policy in a changing environment." *The Journal of Economic Perspectives* 16(1), 213-224.

-Burkhauser, R.V., Andrew J. H., Rovba, L., 2007. "Accounting for the declining fortunes of working-age people with disabilities." Paper presented at *the post ADA employment*, New York University.

-Campbell, J., Lo, A., MacKinlay, C., 1997. *The Econometrics of Financial Markets*. Princeton University Press.

-Card, D., Krueger, A., 1997. "How much do employers and shareholders lose?" *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton University Press, 313-354.

-Fama, E.F., Fisher, L., Jensen, M.C., Roll, R., 1969. "The adjustment of stock prices to new information." *International Economic Review* 10(1), 1-21.

-Genta, Y., 2001. "Kttsukyoku Wakamono no Sigoto ga nakunattta-Koureika syakai no zyakunenn koyo [After all, the young person's work was lost—employment

[40] At present, four risks in the stock market are considered to be mainstream (Gompers et al., 2003; Wolfers, 2006).

of the youth in an aging society].” In *Kigyo koudou to roudou sizyou* [Corporate activity and the labor market]. Nikkei Inc.

-Gompers, P., Ishi, J., Metrick, A., 2003. “Corporate governance and equity prices.” *Quarterly Journal of Economics* 118(1), 107-155.

-Haveman, R.H., Wolfe. B., 2000. “The economics of disability and disability policy.” In: Culyer, A.J., Newhause, J.P. (Eds.). *Handbook of Health Economics*, Vol. 1. Elsevier Science: Amsterdam.

-Hayashi, F., 2000. *Econometrics*. Princeton University Press.

-Hellerstein, J.K., Neumark, D., Troske, K.R., 2002. “Market forces and sex discrimination. ” *Journal of Human Resources* 37(2), 353-380.

-Hersch, J., 1991. “Equal employment opportunity law and firm profitability.” *Journal of Human Resources* 26(1), 139-53.

-Hoyzer, H., Neumark, D., 1999. “Are affirmative action hires less qualified? Evidence from employer–employee data.” *Journal of Labor Economics* 17(3), 534-69.

-Jones, M.K., 2005. “Disability and the labour market: A review of the empirical evidence. ” *WELMERC Discussion Paper Series*, Vol. 2005–04.

-Jones, M.K., 2006. “Is there employment discrimination against the disabled?” *Economic Letters* 92, 32-37.

-Kawaguchi, D., 2007. “A market test for sex discrimination evidence from Japanese firm-level panel data.” *International Journal of Industrial Organization* 25(3), 441-460.

-Kothari, S.P., Warner, J., 2007. “Econometrics of event studies.” In: Eckbo, B.E. (Ed.). *The Handbook of Corporate Finance: Empirical Corporate Finance*. Elsevier: North-Holland.

-MacKinlay, A. Craig., 1997 “Event Studies in Economics and Finance.” *Journal of Economic Literature*, March,35 (1) ,pp.13-39.

-Mckenzie, C.R., McAleer, M., August 1998. “An econometric analysis of event studies in finance.” Paper presented at *the Sixteen South American Meetings of the Econometric Society*. Lima, Peru, 11-14.

-Moreira, M.J., 2003. “A conditional likelihood test for structural models.” *Econometrica* 71(4), 1027-48.

-Murray, M.P., 2006. “Avoiding invalid instruments and coping with weak instruments.” *Journal of Economic Perspectives* 20(4), Fall, 111-132.

-Nakajima, T., Nakano, S., Imai, S., 2006. “Waga kuni no syougaisya koyou nouhukinnseido no keizai bunseki—Syougaisya koyou no sokusin ni mukete [The economic analysis of the quota-levy system in Japan—toward the

promotion of disability employment].” *PRI Discussion Paper Series* No. 05A-23.

-Nagae, A., 2005. “The effect of disability employment on stock prices: Web announcement in Osaka (in Japanese).” *Japanese Journal of Labor Studies* 536, 91-109.

-OECD, 2003. *Transforming Disability into Ability: policies to promote work and income security for disabled people*. OECD.

-Sano, S., 2005. “Is the male-female wage gap due to taste discrimination? (in Japanese).” *Japanese Journal of Labor Studies* 540, 55-67.

-Staigner, D., Stock, J.H., 1997. “Instrumental variables regression with weak instruments.” *Econometrica* 65(3), 557-586.

-Stock, J.H., Yogo, M., 2005. “Testing for weak instruments in IV regression.” In: Andrews, D.W.K., Stock, J.H. (Eds.). *Identification and Inference for Econometric Models: A Festschrift in Honor of Thomas Rothenberg*. Cambridge University Press, 80-108.

-Tezuka, N., 1999. *Nihon no syogaisya koyou sono rekisi gennzyou kadai* [Disability employment in Japan—its history and current state and problems]. Koseikan.

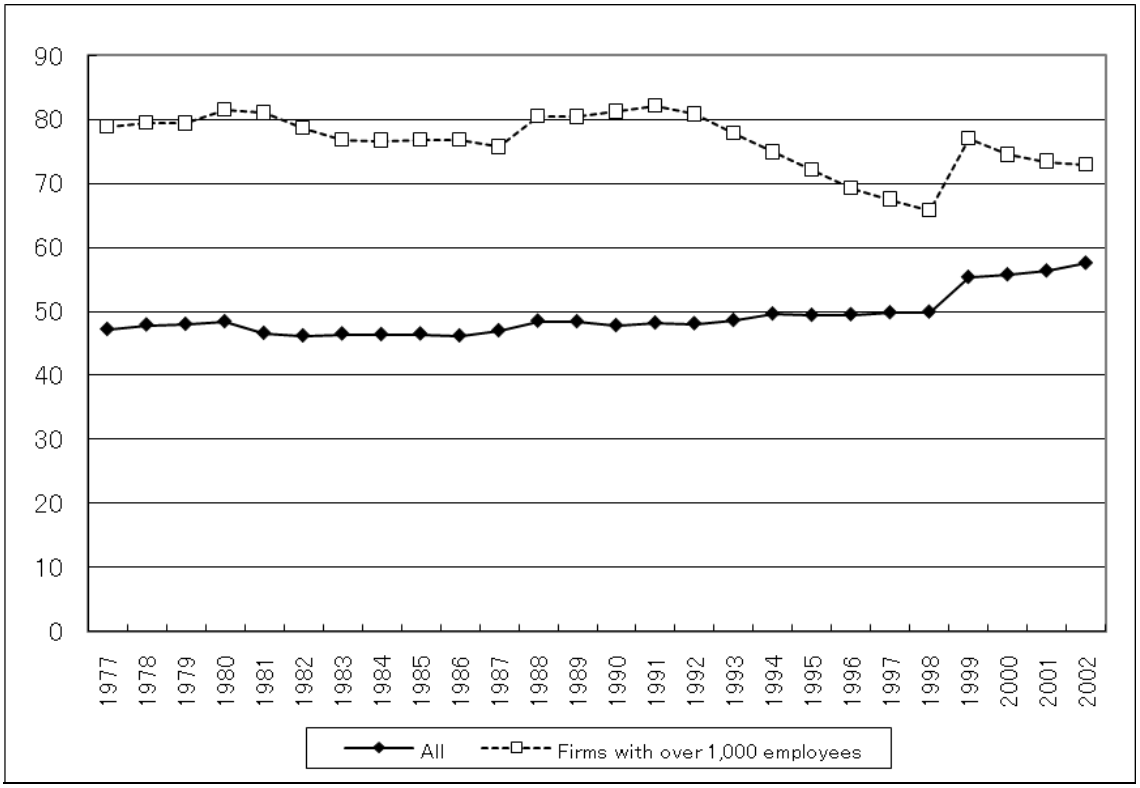
-Thornton, P., 1998. “Employment quotas, levies and national rehabilitation funds for persons with disabilities: Pointers for policy and practice.” *GLADNET Collection* 84, Digital Commons of International Labour Office.

-White, H., 1980. “A heteroskedasticity consistent covariance matrix estimator and a direct test for heteroskedasticity.” *Econometrica* 48(4), 817-838.

-Wolfers, J., 2006. “Diagnosing discrimination: Stock returns and CEO gender.” *Journal of the European Economic Association* 4(2-3), May, 531-541.

-Xepapadeas, A., 1997. *Advanced Principles in Environmental Policy*. Edward Elger.

Figure1. Change in the ratio of companies that did not achieve the legal employment rate from 1977 to 2002.



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

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

Figure2. Concept chart of the event study method

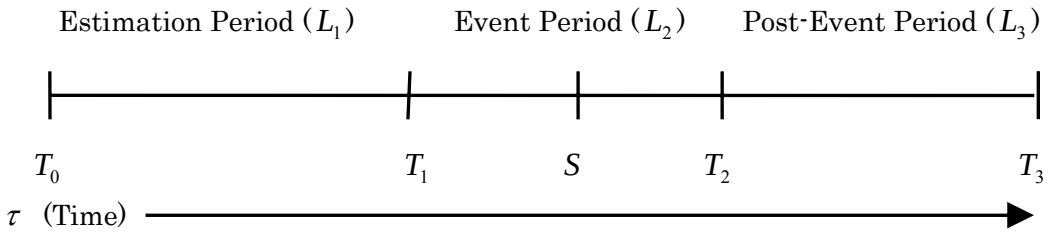


Figure3. Concept chart of the route of expected excess return after information disclosure

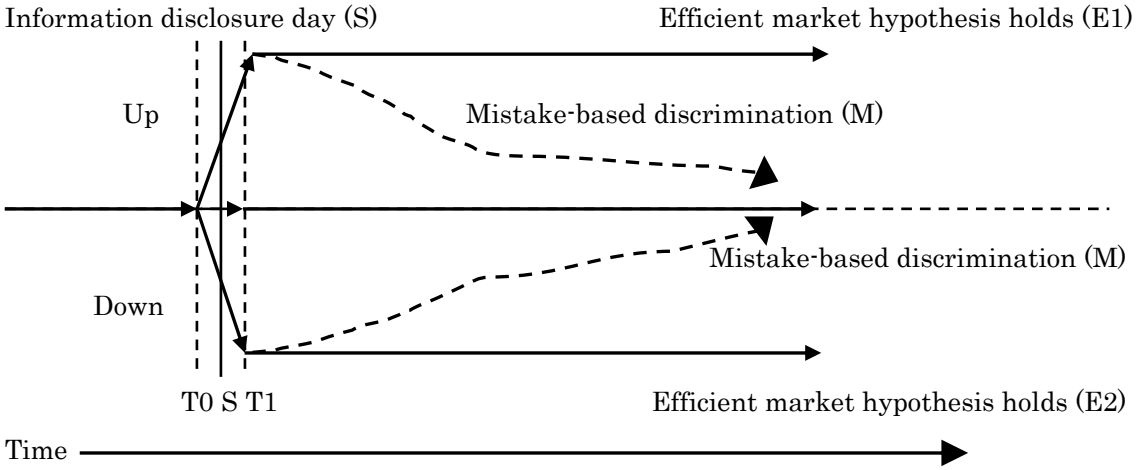


Table1-1. Descriptive statistics to analyze the relationship between the firm profit and the rate of employment of disabled employees in manufacturing firms

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.

Table1-2. Descriptive statistics used to analyze the relationship between firm profit and the rate of the disabled employees in non-manufacturing firms

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Operating income/sales (%)					
Tokyo small and medium	104	0.0663	0.0628	–0.0551	0.2939
Tokyo large	144	0.0688	0.0816	–0.0404	0.5183
Osaka	41	0.0512	0.0476	–0.0064	0.1698
Proportion of disability employment					
Tokyo small and medium	104	0.0072	0.0052	0	0.0166
Tokyo large	144	0.0122	0.0029	0.0028	0.0173
Osaka	41	0.0167	0.004	0.0088	0.0254
Fixed assets/total sales					
Tokyo small and medium	104	0.1532	0.1796	0.0054	1.2355
Tokyo Large	144	0.137	0.1414	0.0121	0.9039
Osaka	41	0.131	0.1305	0.006	0.6577
Debt/total sales					
Tokyo small and medium	104	3.8017	30.1967	0.08	308.624
Tokyo large	144	1.1509	2.1983	0.1333	21.138
Osaka	41	0.871	0.9515	0.1998	4.188
Age of the firm					
Tokyo small and medium	104	48.462	20.815	15	108
Tokyo large	144	54.069	23.29	13	135
Osaka	41	57.366	23.28	17	107
Average age of employees					
Tokyo small and medium	104	35.563	4.297	25.6	44.6
Tokyo large	144	37.241	4.305	25.4	49.6
Osaka	41	36.556	3.955	28.1	45.5

Note: “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.

Table2. The relation between firm profit and the rate of disabled employees

Variables	Manufacturing			Non-manufacturing			Osaka	
	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 age	–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

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.

Table3. 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	All non-manufacturing	153(108)	63(84)	24	19
Glass & Ceramic Products	6(3)	1(2)	0	0	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					
All manufacturing	192(87)	66(74)	45	32					

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

Table4-1. 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 employment rate achievement. With the exception of CAR, variance estimate, LEA dummy, and BHAR, I 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.

Table4-2. Descriptive statistics of the variables used to analyze the impact of the 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 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.

Table5-1. Estimation results for 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***	0.0033	–0.3271***	–0.0628*	–0.0176
	(0.0172)	(0.0516)	(0.0160)	(0.1250)	(0.0370)	(0.0619)
Market Cap.1	0.0238**	0.0235**	0.0061	0.0165*	–0.0090	–0.0177
	(0.0094)	(0.0118)	(0.0052)	(0.0092)	(0.0153)	(0.0173)
DWH		26.9871***		19.5945***		0.7906
Sargan statistic		Yes		Yes		Yes
First-stage f		7.61***		2.60**		6.92***
First-stage probit estimates marginal effect						
Dependent variable R						
Full-time employees	–0.2008***	–0.2008***	0.0272	–0.1161**	0.4068***	0.3782**
	(0.0606)	(0.0607)	(0.0334)	(0.0528)	(0.1495)	(0.1815)
Average yearly income	0.3426	0.3424	–0.3484*	–0.6045***	1.5841*	1.4469
	(0.2800)	(0.2896)	(0.2006)	(0.2099)	(0.7356)	(0.8826)
Average employee age	0.7491	0.7500	–0.2638	0.2981	–0.0779	0.1074
	(0.7042)	(0.7627)	(0.4157)	(0.4373)	(1.3315)	(1.4904)
Age of the firm	–0.0445	–0.0446	0.0273	–0.0250	0.8144**	0.8204**
	(0.1762)	(0.1763)	(0.0904)	(0.0932)	(0.3462)	(0.3491)
Market Cap.1		0.0002		0.1275***		0.0036
		(0.0550)		(0.0036)		(0.1298)
Pseudo R-squared	0.1687	0.1687	0.0746	0.1173	0.4754	0.4761
Log-likelihood value	–92.3307	–92.3307	–135.763	–129.497	–27.4231	–27.3850
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-Hauseman test, and the Sargan statistic shows the results of the over-identifying restrictions test. LEA indicates the legal 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 the coping with the weak Instruments, see footnote 35.

Table5-2. Estimation results for 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	–0.0252*	–0.0334	0.0346*	0.2605***	–0.0454	–0.2045
	(0.0140)	(0.0346)	(0.0178)	(0.1055)	(0.0764)	(0.1914)
Market Cap.1	0.0056	0.0061	–0.0064	–0.0211	–0.0137	0.0085
	(0.0061)	(0.0063)	(0.0061)	(0.0104)	(0.0313)	(0.0301)
DWH		0.0657		8.5899***		0.9068
Sargan statistic		No		No		Yes
First-stage f		8.18***		2.56**		1.28
	First-stage probit estimates marginal effect					
Dependent variable R						
Full-time employees	–0.1931***	–0.1887***	0.0445	0.0215	0.0494	–0.1573
	(0.0575)	(0.0581)	(0.0410)	(0.0513)	(0.1023)	(0.2086)
Average yearly income	0.0153	–0.0211	–0.0143	–0.0473	0.4809	0.4510
	(0.1142)	(0.1219)	(0.1219)	(0.1252)	(0.4747)	(0.5486)
Average employee age	0.9023*	0.9493**	0.3310	0.3478	–0.2951	0.1429
	(0.4769)	(0.4807)	(0.4103)	(0.4097)	(1.1718)	(1.3265)
Age of the firm	–0.2017**	–0.1938*	–0.1139	–0.1057	0.0439	0.0490
	(0.0998)	(0.1001)	(0.0751)	(0.0751)	(0.2492)	(0.2642)
Market Cap.1		0.0424		0.0231		0.1911
		(0.0399)		(0.0312)		(0.1513)
Pseudo R-squared		–113.8083		–121.2543		–22.8834
Log-likelihood value		0.1351		0.07		0.2247
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-Hauseman test, and the Sargan statistic shows the results of the over-identifying restrictions test. LEA indicates the legal 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 the coping with the weak Instruments, see footnote 35.

Table 6. Estimation results for the long-term analysis

	Tokyo small and medium		Tokyo large		Osaka	
	(1)	(2)	(3)	(4)	(5)	(6)
			Manufacturing			
LEA dummy	0.1299	0.1192	0.2424***	–0.1104	0.1172	0.5087
	(0.1143)	(0.3039)	(0.0882)	(0.3315)	(0.1260)	(0.3424)
Profit rate in 2003	–0.3373*	–0.3404*	–1.2117*	–1.1833*	–0.4783	0.7273
	(0.2013)	(0.2040)	(0.6956)	(0.7051)	(1.7677)	(2.1188)
DWH		0.017		3.952**		1.909
Hansen J statistic		Yes		Yes		Yes
First-stage f		3.81***		3.47***		4.71***
Number of observations	156	156	246	246	73	73
			Non-manufacturing			
LEA dummy	–0.1133	0.2354	0.0387	1.9888	–0.1798	–1.0431
	(0.1055)	(0.3600)	(0.0923)	(1.9466)	(0.1770)	(0.8216)
Profit rate in 2003	–3.0677***	–2.8296***	–1.5717**	–2.9181	–2.7866	–2.8992
	(1.0602)	(1.0165)	(0.7486)	(2.2538)	(3.7328)	(3.8856)
DWH		0.1300		5.293**		2.137
Hansen J statistic		Yes		Yes		Yes
First-stage f		6.22***		0.32		0.39
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-Hauseman test, and the Hansen J statistic shows the over-identifying restrictions test results. LEA indicates the legal employment rate achievement. For the coping with the weak Instruments, see footnote 35.