What types of firms relocate their headquarters and why? Analyzing the effects of the dual corporate tax system*

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Abstract

In 2004, the Japanese government introduced the dual corporate tax system, which allows prefectural governments to set their own corporate income tax rates. The purpose of this paper is to examine the effects of this tax reform on firms' location decisions based on a discrete choice model, which investigates what types of firms relocate their headquarters across prefectures and whether their relocation decision was affected by the tax reform. The analysis indicates that the decision to relocate is negatively associated with firms' age and positively associated with their amount of assets, number of employees, debt-to-assets ratio, real estate rent, and payroll. Moreover, firms with a parent company, a foreign subsidiary, fewer business establishments, less capital stock, and fewer employees at the headquarters are more likely to relocate. Since the tax reform, firms tend to avoid relocating to prefectures with a high corporate tax rate.

Keywords: Relocation, firms' headquarters, corporate income tax, dual corporate tax system, tax competition

JEL classification: D22, H25, H7, L2

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1. Introduction

Attracting firms is important to stimulate regional economies. An increase in the number of firms raises the number of employees and tax revenue, and new firms provide positive externalities to existing firms through developing new technologies or offering specialized information. Against this background, a large number of studies have examined firms' location decisions to discover what factors attract firms to a particular location. One important determinant of firms' decision where to locate their activities is the tax burden they face, and it is important for governments to know whether corporate income tax rates affect firms' location choices and whether lowering corporate tax rates helps to increase the number of firms. A widely used approach to measure the effects of taxes is to compare the impact of tax reforms on firms' location decisions. However, the impact of tax reforms by regional governments is rarely examined.

In this context, a useful case study is provided by Japan. Japan employs a centralized government system and prefectural and regional governments have limited authority over taxes, including what is taxed, the tax rates, or the tax base. As a result, there are hardly any differences in taxation across regions, and firms generally decide on the location of their headquarters, business establishments, and factories without taking regional tax differences into account. However, in 2004, the Japanese government implemented a reform of prefectural corporate income taxes and introduced a dual tax system. Before the tax reform, corporate income tax was imposed only on firms' profits. However, following the tax reform, corporate income tax is imposed on firms' profits as well as on their capital and added value. Prefectural governments are allowed to set their own tax rates for these two tax bases and have been given more authority over the taxes. The introduction of the dual tax system has been controversial, since it makes the tax system more complicated and runs counter to international trends.[1] Despite this, the effects of the dual tax system have not yet been examined.

The purpose of this paper is to examine the effects of this dual tax system on firms' location decisions. The analysis uses the "Basic Survey of Japanese Business Structure and Activities" conducted by the Ministry of Economy, Trade and Industry (METI) and examines the following three questions based on a discrete choice model: (1) What types of firms relocate their headquarters across prefectures? (2) To what types of prefecture do firms prefer to relocate their headquarters? And (3) were their relocation decisions affected by the tax reform?

[1] The state of Michigan in the United States has abolished the dual tax system on added value (Single Business Tax) and Germany has abolished the business tax on capital.

This paper is related to the literature studying the effects of corporate income taxes on firms' location decisions.[2] Some studies examine firms' location or relocation decisions across countries (Devereux and Griffith, 1998; Feld and Kirchgässner, 2003; Head and Mayer, 2004; Basile, 2008; Chen and Moore, 2010; Dischinger and Riedel, 2011; Voget, 2011; Becker et al., 2012), while others investigate firms' location decisions within countries (Carlton, 1983; Bartik, 1985; Papke, 1991; Strauss-Kahn and Vives, 2009; Becker et al., 2012; Brülhart et al., 2012). Strauss-Kahn and Vives (2009) examine firms' decision to relocate their headquarters and find that firms avoid relocating their headquarters to regions with high corporate income tax rates.

Employing Strauss-Kahn and Vives's (2009) approach, this paper contributes to the existing literature in the following two respects. First, this paper examines the effects of the dual tax system on firms' relocation decision. No existing studies examine the effects of tax policy changes or tax reforms that give regional governments more authority over taxes on firms' relocation decision. The analysis presented in this paper investigates whether greater authority for prefectural governments over corporate income taxes give rise to tax competition among prefectural governments and whether providing regional governments with such authority is desirable or not. Second, this paper uses data that contain detail financial and cost information on firms and examines in detail the characteristics of firms that relocate their headquarters. In addition, this study distinguishes firms that relocate their headquarters to large cities from firms that relocate their headquarters to locations other than large cities and compares the objectives of each type of firms. The analysis thus provides an indication of what kinds of policies regional governments in rural area should pursue to attract firms.

The analysis indicates that the decision to relocate is negatively associated with firms' age and positively associated with their amount of assets, number of employees, debt-to-assets ratio, real estate rent, and payroll. Moreover, firms with a parent company, a foreign subsidiary, fewer business establishments, less capital stock, and fewer employees at the headquarters are more likely to relocate. Firms relocate their headquarters to large cities based on considerations of business efficiency and/or as a result of corporate restructuring through mergers and corporate break-ups. On the other hand, firms relocate their headquarters to locations other than large cities to reduce their payroll, their real estate rent costs, or their debts. Firms tend to relocate headquarters to prefectures with larger populations, higher per capita income, larger agglomeration effects, higher wages, a higher population density, lower corporate income tax rates, lower land prices, and lower unemployment rates. Since the tax reform, firms have avoided relocating to prefectures

[2] For a survey of the literature, see Devereux and Griffith (2002) and Devereux (2006).

with high corporate tax rates.

The remainder of the paper is organized as follows. Section 2 presents Japan's corporate income tax system and the dual tax reform. Section 3 presents the data sources and provides an outline of the data. Section 4 empirically examines firms' relocation decisions, while Section 5 concludes.

2. Japan's corporate income tax system and the dual tax reform

This section explains Japan's corporate income tax system and the dual tax reform. Japan employs a centralized government system and governments consist of three levels: the central government, prefectural governments, and regional governments. The central government determines most of the tax system, including items to be taxed, tax rates, and the tax base of prefectural and regional governments, and prefectural and regional governments have limited authority to determine their own tax system. That is, they have to set their own tax rates between the ranges that the central government determines and need to apply the definition of the tax base that the central government suggests.

Firms pay corporate income taxes to the three levels government; specifically, they pay corporate income tax to the central government, enterprise tax on corporations and prefectural corporate inhabitant tax to the prefectural government, and municipal corporate inhabitant tax to the regional government. The prefectural and municipal corporate inhabitant taxes both consist of two tax items: a per capita portion and an income based portion. The tax amount of the per capita portion is determined by the amount of capital and the number of employees, while the tax amount of the income based portion is determined by firms' profits. The corporate income tax and enterprise tax amounts also depend on firms' profits. When firms make a loss, they still need to pay the per capita portion of the prefectural and municipal corporate inhabitant taxes, but they are exempt from the other corporate taxes. Data from the National Tax Agency show that only 30-35% of firms paid corporate income taxes to the central government in the 2000s and that most firms did not pay taxes that are based on profits.[3]

Against this background, the Japanese government in 2004 conducted a reform of the prefectural enterprise tax on corporations and introduced the dual tax system. This dual tax system applies to firms with more than 100 million yen in capital and adds firms' capital and added value as part of the tax base to calculate prefectural enterprise taxes. Firms have to pay tax on both capital and added value even when they make a loss, and

[3] Apart from corporate income tax, firms also pay consumption tax and property tax, which, however, are not considered in this study.

the number of firms that pay enterprise taxes increased. This dual tax system allows prefectural governments to set their own tax rates for these two tax bases and provided them with greater authority over the taxes.

3. Data analysis

3.1 Data

This paper uses three data sources: (1) the “Basic Survey of Japanese Business Structure and Activities” (“Basic Survey” hereafter) conducted by the Ministry of Economy, Trade and Industry (METI); (2) the “Hojinjuminzei Hojinjigyozei Zeiritsu Ichiranhyo” (“HHZI” hereafter), which is provided by the Local Tax Bureau of the Ministry of Internal Affairs and Communications; and (3) the “Financial Statements Statistics of Corporations by Industry” (“FSSC” hereafter) provided by the Ministry of Finance.

The Basic Survey is used to examine firms’ relocation decision. The survey started in 1991 and has been conducted annually since 1995. It provides general information on firms (such as their name, location, and date of establishment), their number of business establishments, their number of employees, their relationship with other companies (such as their parent company, subsidiaries, and other related companies), financial data (assets, debts, equity, capital stock, sales, costs), as well as information on outsourcing, research and development, skill development, etc. The survey covers firms with 50 or more employees and with paid-up capital or invested funds of over 30 million yen. If firms do not satisfy these two criteria, they are not included in the survey. Therefore, researchers can identify when firms entered the market based on the date of establishment, but they do not know when firms exit the market.

The HHZI lists all corporate tax rates employed by prefectural and regional governments and is used to compute effective corporate income tax rates across prefectures.

The FSSC is used in conjunction with the data from the Basic Survey to examine what percentages of firms pay corporate income taxes. The FSSC has been compiled since 1948 and provides general information on firms (such as their name and location), financial information (sales, assets, liabilities, profits and losses, dividend payments, depreciation costs and expenses, etc.), and the number of board members and employees. The FSSC is based on a sampling survey and only firms with a certain amount of capital are always included. Therefore, the FSSC is not an exhaustive survey of all firms that exist in the market.

The analysis uses Basic Survey data from 1995 to 2013 to examine firms' relocation decision between 1996 and 2013. Two methodologies are employed to examine the following two questions. First, a logit model is used to examine what types of firms are likely to relocate their headquarters. Second, a conditional logit model is employed to investigate to what types of prefectures firms prefer to relocate their headquarters. Three different time periods are examined to investigate the effects of the dual tax reform on firms' relocation decisions: the entire observation period (from 1996 to 2013), the period before the tax reform (from 1996 to 2003), and the period after the tax reform (from 2004 to 2013). Moreover, since the tax reform applied only to firms with more than 100 million yen of capital funds, the difference between these firms and firms that were not affected by the tax reform is also investigated.

Whether a firm relocated or not is identified by checking whether the name of the prefecture where the headquarters are located changed from the previous year. As mentioned, the Basic Survey only covers firms with 50 or more employees and with paid-up capital or invested funds of over 30 million yen, so if firms do not satisfy these two criteria, they are not included in the survey. Researchers cannot identify when firms relocate their headquarters if these firms relocate the headquarters during the time when they do not satisfy the two criteria and are not included in the survey. Therefore, such firms are excluded from the analysis. In addition, mergers or the corporate break-ups of firms may result in a change in the location of firms' headquarters,[4] and the location choices of newly established firms and firms that are involved in a merger or corporate break-ups will be compared.

3.2 Basic data analysis

This section investigates the characteristics of firms that relocate their headquarters, effective corporate income tax rates across prefectures, and the percentages of firms that pay corporate income taxes using the three data resources.

Figure 1 shows the number of firms that relocated their headquarters between 1996 and 2013. The total number of firm relocations is 2,503, and the years with the largest number of relocations are 1997 and 1998. Likely reasons for this spike are the sharp decline in land prices at this time as well as financial reorganization due to Japan's financial "Big Bang" deregulation.

[4] See Holloway and Wheeler (1991) and Strauss-Kahn and Vives (2009) for details.

Figure 1: Number of firm relocations

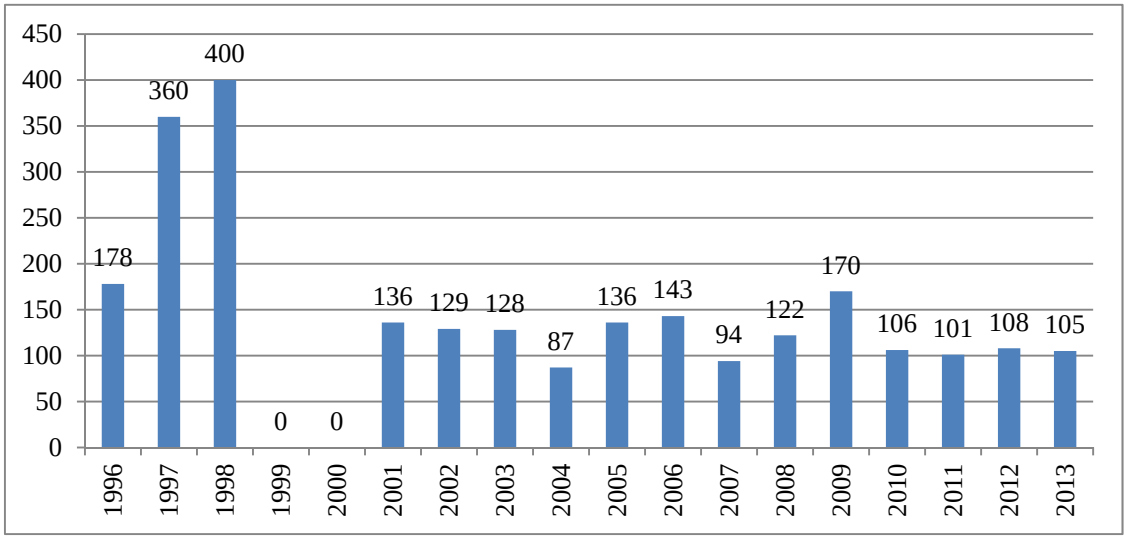


Table 1 presents the industry distribution of firms that relocated their headquarters. The table indicates that firms that relocated their headquarters are concentrated in particular industries. Specifically, industries with the largest number of relocations are manufacturing as well as wholesale and retail trade.

Table 1: Number of firm relocations by industry

Industry	Number of firms	Share (%)
Agriculture and forestry	0	0.00
Fisheries	0	0.00
Mining and quarrying of stone and gravel	4	0.16
Construction	30	1.20
Manufacturing	1,530	61.13
Electricity	1	0.04
Information and communications	142	5.67
Transport and postal activities	9	0.36
Wholesale and retail trade	574	22.93
Finance and insurance	7	0.28
Real estate agencies and goods rental and leasing	20	0.80
Scientific and development research institutes	31	1.24
Accommodations	38	1.52
Living-related and personal services	35	1.40
Miscellaneous education and learning support	6	0.24
Medical services	0	0.00
Compound services	0	0.00
Miscellaneous services	76	3.04

Next, Table 2 shows the percentage of firms that relocated to Tokyo (Japan's capital) or Osaka (Japan's second-largest city) and the percentage of firms that relocated to other prefectures. About 30-40 % of firms relocated to the two prefectures, reflecting the fact that these two prefectures are the major business centers of Japan.

Table 2: Percentage of firms that relocated to Tokyo/Osaka and to other prefectures

	Relocated to Tokyo/Osaka (%)	Relocated to other prefectures (%)
1996	33.71	66.29
1997	56.67	43.33
1998	28.00	72.00
2001	26.47	73.53
2002	32.56	67.44
2003	36.72	63.28
2004	39.08	60.92
2005	37.50	62.50
2006	39.86	60.14
2007	34.04	65.96
2008	38.52	61.48
2009	32.94	67.06
2010	34.91	65.09
2011	33.66	66.34
2012	46.30	53.70
2013	38.10	61.90

In Table 3, Japan's 47 prefectures are grouped into 10 regions and the distribution of firms that relocated their headquarters is shown. About 6% of firms left the North Kanto region, about 55% of firms moved from the South Kanto region, and about 21% of firms relocated from the Kinki region, which means that these three regions accounted for about 80% of firms that relocated their headquarters. The North Kanto region consists of Ibaraki, Tochigi, Gunma, Yamanashi, Nagano prefectures, all of which are close to Tokyo prefecture. The South Kanto region includes Tokyo (the capital), while the Kinki region includes Osaka (Japan's second-largest city). This pattern indicates that firms that relocated their headquarters are concentrated in areas which are close to the capital or other major cities and that firms established in these areas were more likely to relocate their headquarters.

Table 3: Number of firm relocations across 10 regions

Region	Prefectures	Number of firms	Share (%)
Hokkaido	Hokkaido	14	0.56
Tohoku	Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima	64	2.56
North Kanto	Ibaraki, Tochigi, Gunma, Yamanashi, Nagano	146	5.83
South Kanto	Saitama, Chiba, Tokyo, Kanagawa	1,377	55.01
Hokuriku	Niigata, Toyama, Ishikawa, Fukui	48	1.92
Toukai	Gifu, Shizuoka, Aichi, Mie	144	5.75
Kinki	Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama	531	21.21
Chugoku	Tottori, Shimane, Okayama, Hiroshima, Yamaguchi	63	2.52
Shikoku	Tokushima, Kagawa, Ehime, Kochi	30	1.20
Kyushu	Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa	86	3.44

Table 4: Number of entries and exits of firms across 47 prefectures

	Number of entries	Number of exits	Number of entries - Number of exits
Hokkaido	24	14	10
Aomori	4	5	-1
Iwate	16	13	3
Miyagi	23	8	15
Akita	8	7	1
Yamagata	12	10	2
Fukushima	32	21	11
Ibaraki	76	45	31
Tochigi	43	30	13
Gunma	43	34	9
Saitama	193	142	51
Chiba	123	112	11
Tokyo	790	908	-118
Kanagawa	263	215	48
Niigata	26	18	8
Toyama	14	11	3
Ishikawa	7	11	-4
Fukui	9	8	1
Yamanashi	16	11	5
Nagano	29	26	3
Gifu	32	18	14
Shizuoka	55	43	12
Aichi	67	71	-4
Mie	23	12	11
Shiga	35	17	18
Kyoto	40	40	0
Osaka	183	348	-165
Hyogo	106	107	-1
Nara	13	17	-4
Wakayama	6	2	4
Tottori	5	5	0
Shimane	5	5	0
Okayama	21	11	10
Hiroshima	18	31	-13
Yamaguchi	19	11	8
Tokushima	4	4	0
Kagawa	15	14	1
Ehime	9	12	-3
Kochi	0	0	0
Fukuoka	46	37	9
Saga	5	8	-3
Nagasaki	7	7	0
Kumamoto	10	6	4
Oita	7	10	-3
Miyazaki	7	9	-2
Kagoshima	11	7	4
Okinawa	3	2	1

Figure 2: Number of entries and exits of firms across 47 prefectures

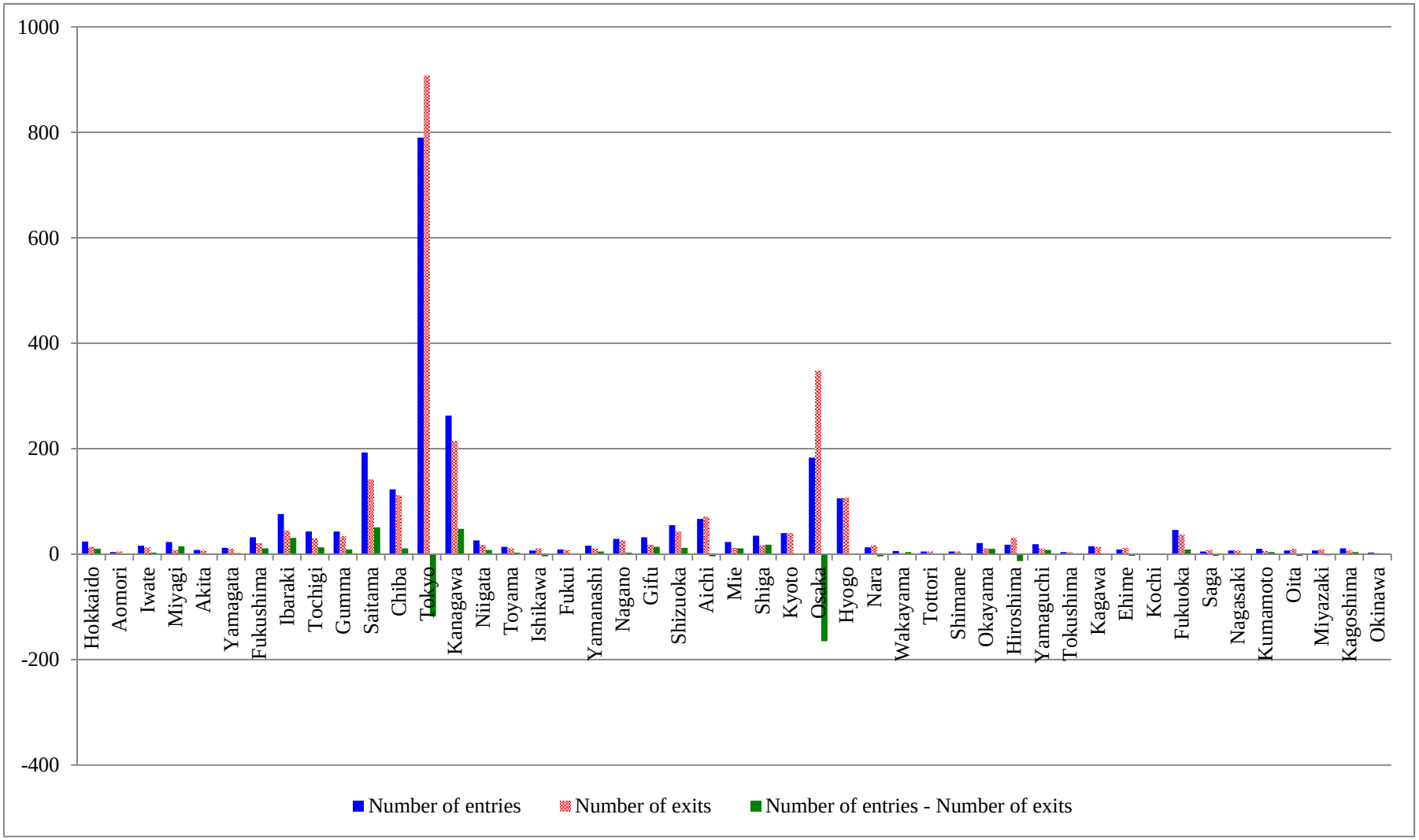


Table 4 and Figure 2 show the number of firm entries from other prefectures and exits to other prefectures across all 47 prefectures and indicate that firm turnover is higher in places around Tokyo and Osaka. Some prefectures around Tokyo and Osaka have positive net entries (=number of entries – number of exits), while Tokyo and Osaka have negative net entries, meaning that the number of firm exits is larger than the number of firm entries. This result implies that firms prefer to locate close to large cities around Tokyo and Osaka, but land prices in the two prefectures are much higher than land prices in other prefectures and high land prices force firms to leave Tokyo and Osaka.

Next, effective corporate income tax rates across prefectures are computed. The effective corporate income tax rate is defined as follows:

$$\text{Effective corporate income tax rate} = \frac{\text{CIT} \times (1 + \text{LIT}) + \text{ETC}}{1 + \text{ETC}}$$

CIT: corporate income tax
ETC: enterprise tax on corporations
LIT: prefectural corporate inhabitant tax + municipal corporate inhabitant tax

Corporate income tax and enterprise tax on corporations depend on firms' profits. There are two corporate income tax rates: a lower tax rate that is applied to firms with profits of less than eight million yen and a higher tax rate that is applied to firms with profits of more than eight million yen. Meanwhile, there are three enterprise tax rates: the lowest tax rate is applied to firms with profits of less than four million yen, an intermediate tax rate is applied to firms with profits between four and eight million yen, and the highest tax rate is applied to firms with profits of more than eight million yen. In addition, the dual tax system is applied to firms with more than 100 million yen in capital funds, and there are six effective tax rates in total for each prefecture. The six effective tax rates are shown in Table 5.

Table 5: The six effective tax rates

Name of tax	Characteristics of firms to which the tax rate is applied
Low-tax	Firms with profits of less than four million yen and less than 100 million yen in capital funds
Middle-tax	Firms with profits between four and eight million yen and less than 100 million yen in capital funds
High-tax	Firms with profits of more than eight million yen and less than 100 million yen in capital funds
Dual-low-tax	Firms with profits of less than four million yen and more than 100 million yen in capital funds
Dual-middle-tax	Firms with profits between four and eight million yen and more than 100 million yen in capital funds
Dual-high-tax	Firms with profits of more than eight million yen and more than 100 million yen in capital funds

Figure 3: Average of the six effective tax rates

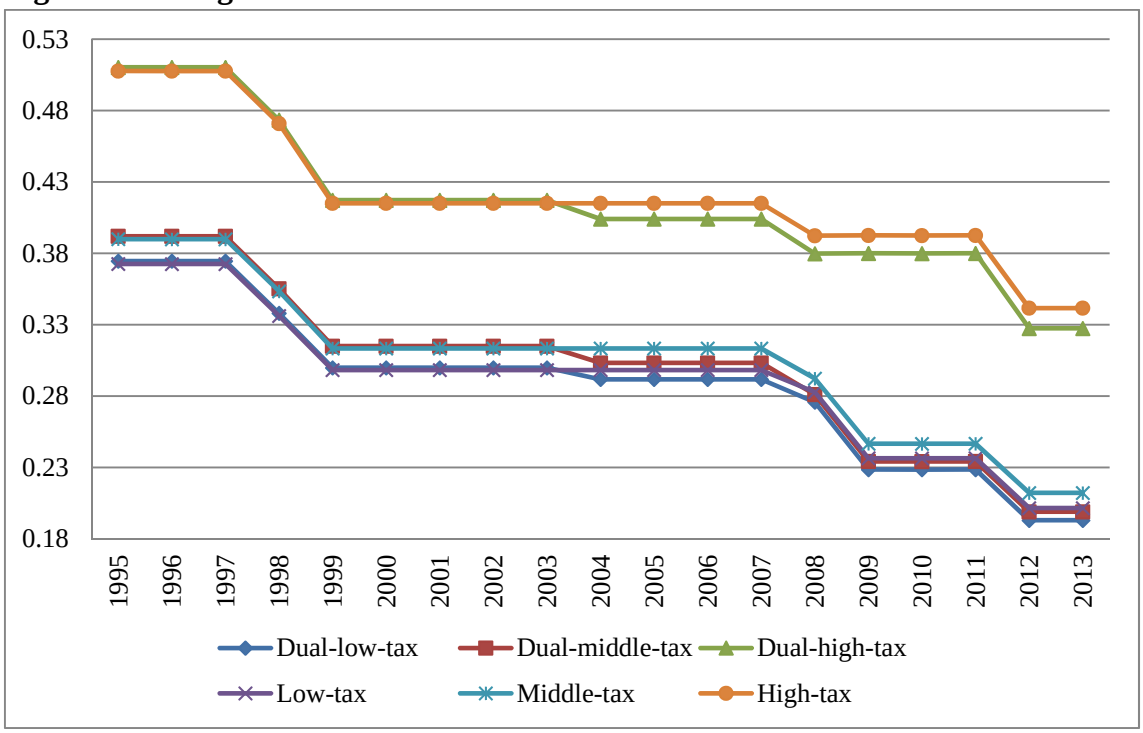


Figure 4: Standard deviation of the six effective tax rates

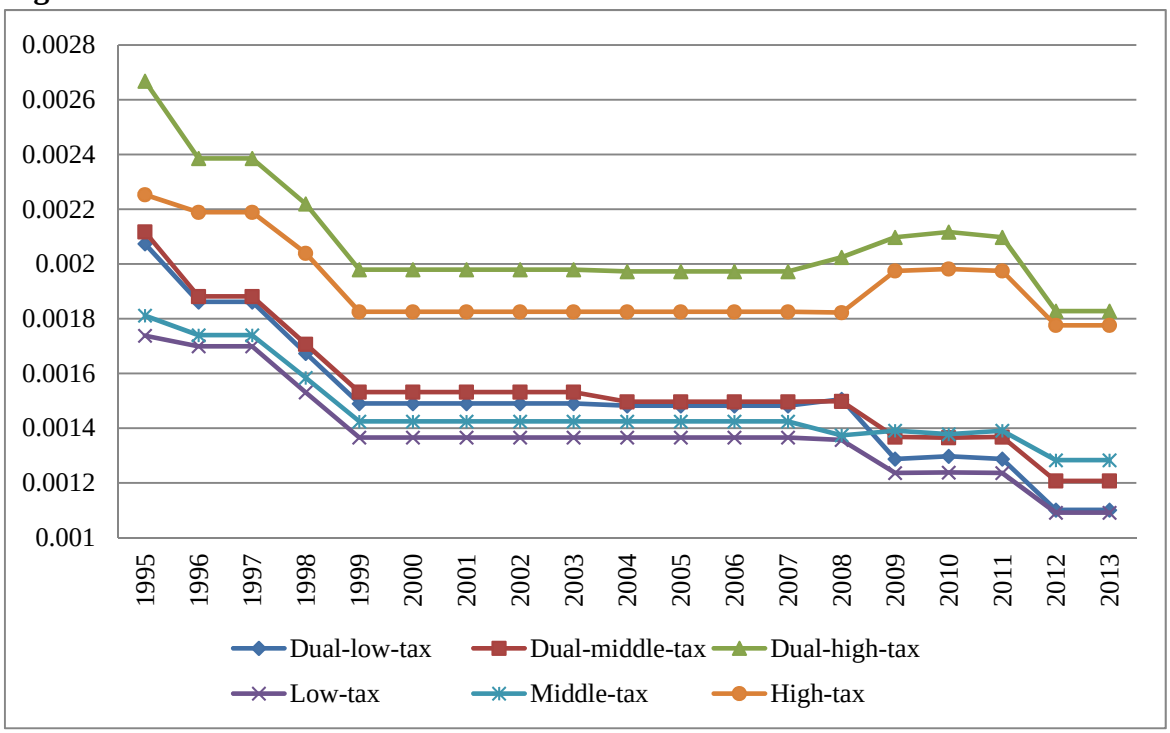


Figure 3 depicts the average of the six effective tax rates across prefectures between 1995 and 2013 and shows that effective tax rates declined in 1998, 1999, 2008, 2009, and 2012.

The decline in these years was due to the decrease in corporate income tax rates in 1998, 1999, 2009, and 2012 and the reform of the enterprise tax on corporations in 2008. Dual-low-tax, dual-middle-tax and dual-high-tax declined in 2004 due to the introduction of the dual tax system. Only a few prefectures have changed their tax rates since the introduction of the dual tax system, and the decline of the tax rates is mostly attributable to the decrease in corporate income tax rates. Figure 4 presents the standard deviation of the six effective tax rates across prefectures between 1995 and 2013. The figure shows the differences in effective tax rates across prefectures and indicates that the standard deviation declined in the latter half of the 1990s and then remained more or less unchanged until 2008. After 2008, the standard deviation of the dual-high-tax rate and the high-tax rate increased, while the standard deviation of the other tax rates decreased. The reason for the pattern observed after 2008 is that the corporate income tax rate was lowered in 2009 and that the weights of both the enterprise tax on corporations and the prefectural corporate inhabitant tax in the definitions of the effective corporate income tax increased, which resulted in more pronounced tax differences across prefectures. This implies that it is important to take both the central and prefectural governments' tax rates into account when examining the effects of tax rates on firms' location decisions. On the whole, even after the introduction of the dual tax system, most prefectural governments did not change their tax rates and there is not much difference in tax rates across prefectures.

Finally, the percentage of firms that pay corporate taxes is examined using both the Basic Survey and the FSSC. As explained in Section 2, when firms make a loss, they are exempt from paying corporate taxes that are based on profits. If most of the firms that relocated their headquarters did not pay taxes, their relocation decision will not have been affected by the tax reform. Unfortunately, the Basic Survey does not include tax data, while the FSSC only provides data on the total amount of corporate taxes that firms pay to all three levels of government together. Therefore, using firms' names, the two datasets are merged in order to estimate the percentage of firms that pay taxes. According to the "Chiho Zaisei Tokei Nenpo," published by Ministry of Internal Affairs and Communications, the per capita portion of prefectural and municipal corporate inhabitant taxes amounts to approximately 1% of a firm's profits. Therefore, if firms pay taxes that are larger than 1% of their profits, they are considered to pay corporate income taxes. The percentage is estimated using a logit model, where the dependent variable is a dummy indicating whether a firm paid corporate income taxes or not, while explanatory variables include variables on firms' characteristics such as their investment, number of employees, other taxes (such as documentary stamp tax, registration and license tax, property tax, real

estate acquisition tax, depreciable property tax, car taxes, etc.) and public charges, profits, a dummy indicating whether they have an overseas subsidiary, and year dummies. Applying this logit model to the Basic Survey data suggests that about 90% of firms were paying taxes. This value seems large compared to data from the National Tax Agency, which indicates that only 30-35% of firms pay taxes. However, the Basic Survey includes only large firms (in terms of both the amount of assets and the number of employees), so that the result does not seem unreasonable. Thus, the logit estimation suggests that firms were paying taxes and that will have been affected by the dual tax reform.

4. Empirical analysis: Firm' relocation decision

4.1 Estimation Method

This section explains the methodology employed to examine firms' relocation decisions. To begin with, what types of firms decide to relocate their headquarters is investigated using the following logit model:

$$\mathrm{Prob}(Y_{it}=1) = \alpha + \beta X_{it-1} + \underbrace{\theta_m}_{\substack{\text{Industry}\\ \text{dummies}}} + \underbrace{\omega_t}_{\substack{\text{Year}\\ \text{dummies}}} + \underbrace{\mu_k}_{\substack{\text{Regional}\\ \text{dummies}}} + \underbrace{\varepsilon_{it}}_{\substack{\text{Error}\\ \text{term}}}$$

where the dependent variable is a dummy variable indicating whether firm i relocated its headquarters in year t or not ($Y_{it}=1$ means relocation, $Y_{it}=0$ means no relocation). Explanatory variables consist of vector X_{it-1} representing firms' characteristics, industry dummies θ_m, year dummies ω_t, and regional dummies μ_k. α is a constant and β represents the parameters to be estimated. It is assumed that firms' relocation decision is determined based on data of the previous year. Firms' characteristics included in X_{it-1} are the number of business establishments, the number of employees, the number of employees at the headquarters, the amount of assets, firm age, the debt-to-assets ratio, the advertising-to-sales ratio, the ratio of real estate rent to total costs, the ratio of payroll expenses to total costs, capital stock, a dummy variable indicating whether a firm has a parent company, a dummy variable indicating whether a firm has one or more domestic subsidiaries, and a dummy variable indicating whether a firm has one or more overseas subsidiaries. It is possible that a firm's headquarters were relocated as a result of a merger or corporate break-ups, so that a dummy variable indicating whether firms were established through a merger or corporate break-ups is also included. The basic statistics of explanatory variables are shown in Appendix Table A.1.

Next, to what types of prefectures firms prefer to relocate their headquarters is investigated using the following conditional logit model:

$$P_{ijt} = \frac{exp(T_{ijt}\delta + x_{ijt-1}\gamma)}{\sum_{j=1}^{47} exp(T_{jit}\delta + x_{ijt-1}\gamma)}$$

where the dependent variable P_{ijt} is the probability that firm i relocates its headquarters to prefecture j in year t. Explanatory variables are the effective tax rate, T_{ijt}, as well as socio-economic variables for the prefecture x_{ijt-1}, which include the population, per capita income, the average wage, the average price of land, the number of firms in the same industry (to gauge agglomeration effects), the price of electricity, the unemployment rate, the population share of young people (those aged under 15), the population density, airport facilities (the number of flights, the number of passengers, the share of international flights, the share of foreign passengers),[5] government expenditure (per capita public investment, per capita expenditure on public education, per capita public debt), and the distance between the new prefecture and the original prefecture. δ and γ are parameters to be estimated. It is assumed that firms decide whether and where to relocate based on socio-economic data for the previous year. On the other hand, with regard to the tax rate, it is assumed that what matters for firms' relocation decision is the expected effective tax rate in the new prefecture, so that the effective tax rate of the current year is used in the estimation. It seems reasonable to assume that when the tax reform was implemented in 2004, firms had ample information on the details of the reforms before the implementation. In addition, several other tax reforms were implemented between 1996 and 2013 and it is likely that firms took the impact of these reforms on the (expected) effective tax rate into account when making their relocation decision. Consequently, three different observation periods are used to examine the effects of the dual tax reform on firms' relocation decisions: the entire observation period (1996 to 2013), the period before the tax reform (1996 to 2003), and the period after the tax reform (2004 to 2013). In addition, this tax reform only applied to firms with more than 100 million yen in capital funds, so that the difference between such firms and firms that were unaffected by the tax reform is also investigated. The data sources and basic statistics of explanatory variables are shown in Appendix Tables A.2 and A.3.

[5] The reason for including this variable is that Strauss-Kahn and Vives (2009) find that airport facilities are an important determinant of the relocation decision.

4.2 Estimation Results

4.2.1 Characteristics of firms that relocated their headquarters

Table 6 presents the results of the logit estimations examining the characteristics of firms that relocated their headquarters. Regression (1) includes industry dummies, regression (2) includes both industry and year dummies, and regression (3) includes industry, year, and regional dummies. In addition, to investigate differences between firms that relocated to Tokyo or Osaka and firms that relocated to other prefectures, regression (4) estimates a logit model where the dependent variable is a dummy indicating whether a firm relocated to Tokyo or Osaka, while regression (5) estimates a logit model where the dependent variable is a dummy indicating whether a firm relocated to prefectures other than Tokyo and Osaka. The results for the year dummies are not shown to conserve space.[6]

Regression (1) shows that the coefficient on the number of business establishments is negative and significant, indicating that firms that have many business establishments are unlikely to relocate their headquarters. The coefficient on the number of employees is positive and significant, while the coefficient on the number of employees at the headquarters is negative and significant. These results suggest that firms with many employees – i.e., larger firms – are more likely to relocate headquarters, although firms with many employees at the headquarters are less likely to relocate, probably because of the high cost of transferring a large number of staff. The coefficient on assets is positive and significant, indicating that firms with a large amount of assets are more likely to relocate their headquarters, presumably because they are more likely to be able to afford the costs involved. The coefficient on firm age is negative and significant, implying that younger firms are more likely to relocate their headquarters. One explanation is that young firms are more likely to grow and have not yet establish strong networks in their original location. The coefficients on the debt-to-assets ratio, the ratio of real estate rent to total costs, and the ratio of payroll expenses to total costs are all positive and significant, indicating that firms with larger debt, larger real estate rents, and higher payroll costs are more likely to relocate. These results imply that such firms tend to relocate in order to bring down costs by reducing real estate rents and payroll cost and/or to improve their financial situation. The coefficient on the advertising-to-sales ratio is insignificant, indicating that the advertising-to-sales ratio has little effect on firms' relocation decision.

[6] A random parameter logit model is also estimated taking the length of the estimation period – i.e., the 17 years from 1996 to 2013 – into account, and the results are almost the same as in regression (1).

The coefficient on capital stock is negative and significant, implying that firms with a large amount of capital stock have a lower probability of relocating. The coefficient on the dummy indicating whether a firm has a parent company is positive and significant, suggesting that firms with a parent company are more likely to relocate. The coefficient on the dummy indicating whether a firm has domestic subsidiaries is insignificant, while the coefficient on the dummy indicating whether a firm has foreign subsidiaries is positive and significant, implying that firms with foreign subsidiaries are more likely to relocate their headquarters. The coefficient on the dummy indicating whether a firm was established through a merger or a corporate break-up is insignificant, indicating that whether firms were involved in a merger or corporate break-up does not have much effect on firms' relocation decision. Among industry dummies, only the coefficients for manufacturing and the information and communication industry are positive and significant, while the coefficient for the accommodations industry is negative and significant. Firms in manufacturing and the information and communication industry are more likely to relocate, while firms in the accommodations industry are less likely to move their headquarters, which is consistent with the results in Table 1.

The results of regressions (2) and (3) do not differ much from those of regression (1). In regression (2), the coefficient on the ratio of payroll expenses to total costs becomes insignificant, indicating that payroll costs do not have much effect on the relocation decision. This result might be due to the fact that wages in Japan have been declining since 1997 and year dummies absorb the effects of payroll costs. The coefficient on the wholesale and retail industry dummy becomes negative and significant, suggesting that firms in this industry are less likely to move. In regression (3), the coefficients on the ratio of payroll expenses to total costs and the capital stock become insignificant. The coefficient on the Hokkaido dummy is negative and significant, indicating that firms in this area are less likely to move their headquarters. On the other hand, the coefficients on the South Kanto, North Kanto, and Kinki area dummies are positive and significant, suggesting that firms in these areas are more likely to relocate their headquarters, which is consistent with the results in Table 3.

Comparing the results of regression (4) with those of regression (5) shows the difference between firms that relocated their headquarters to Tokyo or Osaka and firms that relocated their headquarters to other prefectures. There are four main differences. First, the coefficient on the debt-to-assets ratio is negative and significant in both regressions, but it is only significant at the 10% level in regression (4), indicating that the influence of a firm's financial situation on its relocation decision is weak. Second, the coefficient on the ratio of payroll expenses to total costs is insignificant in regression (4),

while it is positive and significant in regression (5). This implies that the burden of payroll expenses is smaller for firms that relocated their headquarters to Tokyo or Osaka than firms that relocated their headquarters to other prefectures. Third, while the coefficient on the dummy indicating whether a firm was established through a merger or corporate break-up is significant in regression (4), it is insignificant in regression (5), suggesting that mergers and corporate break-ups played a role in the relocation decision of firms that relocated their headquarters to Tokyo or Osaka. Fourth, the results for the industry dummies differ: the coefficient for the information and communication industry is positive and significant, while the coefficient for the wholesale and retail trade industry is negative and significant in regression (4). On the other hand, the coefficient for the manufacturing sector is significant in regression (5), indicating that firms in the manufacturing sector are likely to relocate to prefectures other than Tokyo and Osaka. Taken together, these differences imply that firms that relocated their headquarters to Tokyo or Osaka make their relocation decision based on considerations of business efficiency provided by access to a large city and/or as a result of corporate restructuring through mergers and corporate break-ups, while their financial situation does not play a substantial role in their relocation decision. On the other hand, firms that relocated their headquarters to other prefectures do so in order to reduce payroll and real estate rental costs, and firms in the manufacturing sector are likely to relocate to prefectures other than Tokyo and Osaka.

To examine whether firms that relocated to other prefectures have different objectives from firms that relocated to Tokyo or Osaka, Figures 5(a) to (c) compare the rate of change in the number of employees, in real estate rents, and in payrolls among three groups of firms: (1) firms that did not move, (2) firms that relocated to Tokyo or Osaka, and (3) firms that relocated their headquarters to prefectures other than Tokyo or Osaka. The figures indicate that firms that relocated to a prefecture other than Tokyo or Osaka registered a substantial reduction in the number of employees, suggesting that these firms were shrinking or used the opportunity of relocating their headquarters to reduce their workforce. In addition, such firms also experienced a reduction in real estate rents and payrolls, suggesting that such firms relocated in order to reduce costs.

Figure 5(a): Number of employees

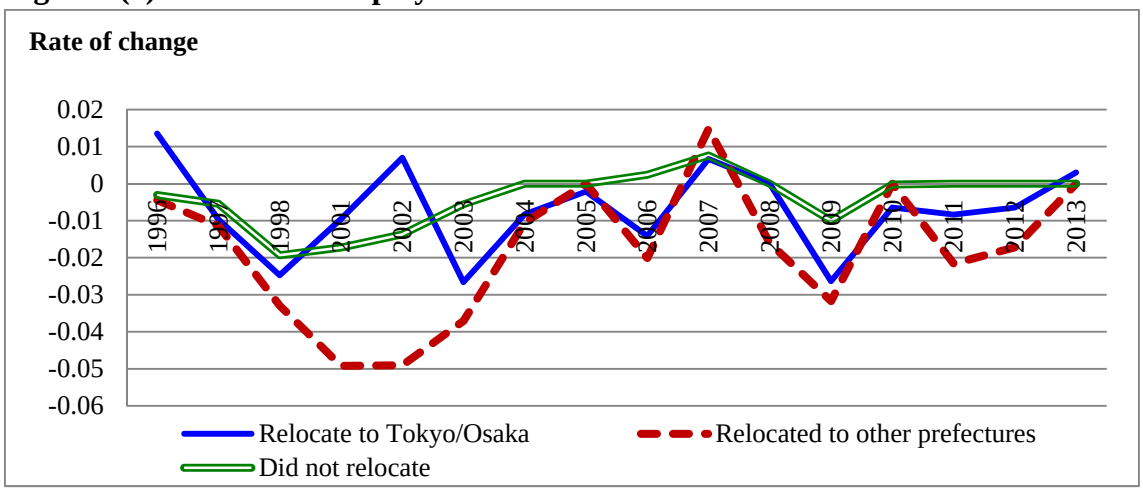


Figure 5(b): Real estate rents

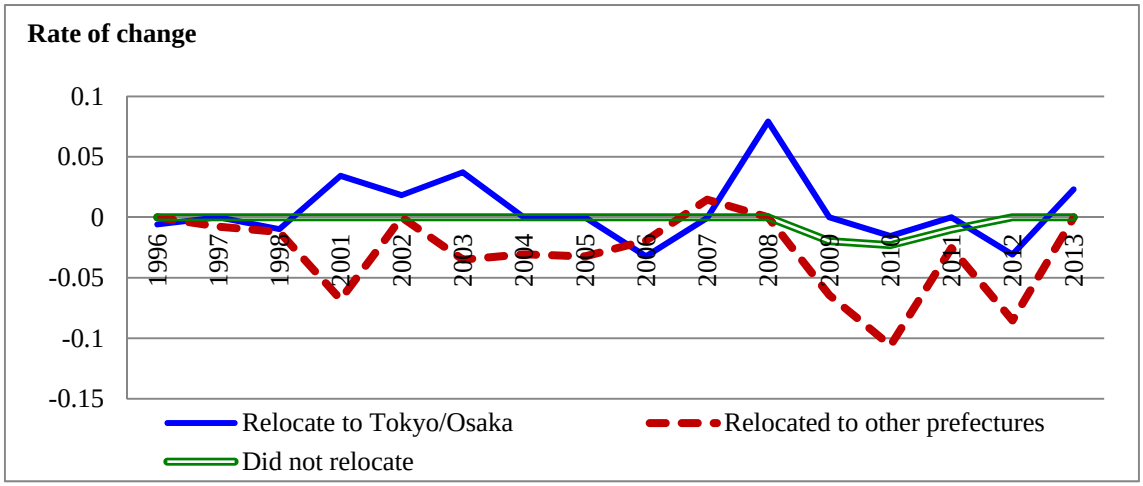
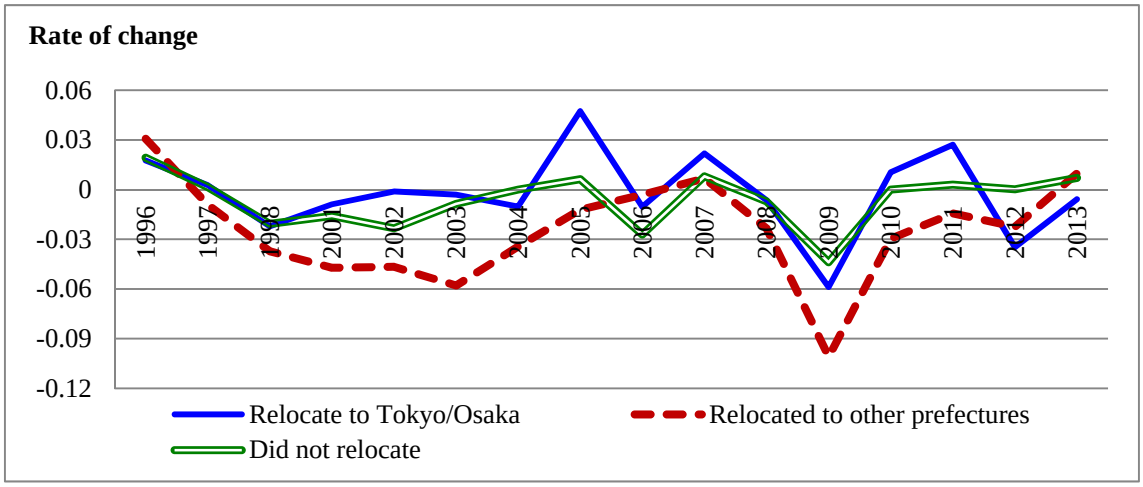


Figure 5(c): Payrolls



The findings so far can be summarized as follows. The decision to relocate is negatively associated with firms' age and positively associated with their amount of assets, number of employees, debt-to-assets ratio, real estate rent, and payroll. Moreover, firms with a parent company, a foreign subsidiary, fewer business establishments, less capital stock, and fewer employees at the headquarters are more likely to relocate. Firms that relocate their headquarters to Tokyo or Osaka do so for different reasons than firms that relocate their headquarters to other prefectures. The former choose Tokyo or Osaka based on considerations of business efficiency provided by access to a large city and/or as a result of corporate restructuring through mergers and break-ups. On the other hand, the latter relocate their headquarters to reduce payroll and real estate rent costs and firms in the manufacturing sectors are likely to relocate to prefectures other than Tokyo and Osaka.

4.2.2 Characteristics of prefectures to which firms relocated their headquarters

This sections show the results of the conditional logit estimation examining to what types of prefectures firms preferred to relocate their headquarters. Three different time periods are examined to investigate the effects of the dual tax reform on firms' relocation decision. The results are presented in Table 7, consisting of five regressions. Regression (6) uses data for the entire observation period (from 1996 to 2013), regressions (7) and (9) use data for the period before the tax reform (from 1996 to 2003), and regressions (8) and (10) use data for the period after the tax reform (from 2004 to 2013).

Regression (6) shows that the coefficient on the effective corporate income tax rate is negative and significant, indicating that firms avoid relocating their headquarters to prefectures with a high corporate income tax rate. The coefficients on the population and per capita income variables are positive and significant, implying that firms prefer to relocate their headquarters to prefectures with a large population and a high per capita income. The coefficient on wages is positive and significant, meaning that firms prefer to choose prefectures with higher wages. This result may seem counterintuitive, but given that higher wages typically imply that workers have higher skills, it likely reflects that firms prefer to relocate to prefectures where they can secure a skilled workforce. The coefficient on land prices is negative and significant, suggesting that firms tend to avoid relocating to prefectures with high land prices. The coefficient on the number of firms in the same industry (agglomeration effects) is positive and significant, indicating that firms choose prefectures where firms in the same industry are concentrated. The coefficient on the price of electricity is insignificant, implying that the cost of electricity has little effect on the relocation decision. The coefficient on the unemployment rate is negative and

significant, meaning that firms avoid relocating to prefectures with a high unemployment rate. The coefficient on the population share of young people is insignificant, suggesting that firms' relocation decision is not linked to the population share of young people. The coefficient on the population density is positive and significant, indicating that firms prefer to relocate their headquarters to prefectures with a high population density. The variables on the number of flights and passengers are excluded from the estimations reported here, since preliminary estimates showed these to be insignificant. The coefficient on the share of international flights is positive and significant, while the coefficient on the share of foreign passengers is negative and significant. These results imply that firms are likely to relocate to prefectures that have easy access to international air travel and good airport facilities to Japanese businessmen. The coefficient on public investment is positive and significant and the coefficient on public debt is negative and significant, while the coefficient on expenditure on public education is insignificant. These results imply that firms prefer to choose prefectures with sufficient public investment and lower public debt. The coefficient on the distance between the original prefecture and a new prefecture is insignificant, meaning that the distance that firms need to move does not have much influence on the relocation decision.

Regressions (7) and (8) compare the effects of effective corporate income tax rates on firms' relocation decision before and after the tax reform. The coefficients on the effective corporate income tax rate in regression (7) (before the dual tax reform) and (8) (after the dual tax reform) are both insignificant, implying that the effective corporate income tax rate does not influence firms' relocation decision. To confirm these results, regressions (9) and (10) exclude firms that were involved in a merger or corporate break-up. The coefficient on the effective corporate income tax rate in regression (9) (before the dual tax reform) is insignificant, although the coefficient on the effective corporate income tax rate in regression (10) (after the dual tax reform) is negative and significant, indicating that after the tax reform, firms avoided relocating to prefectures with a high corporate income tax rate. This result implies that a merger or corporate break-up have an impact on firms' choice of where to relocate their headquarters.

Table 8 compares the effects of effective corporate income tax rates on firms' relocation decision between firms to which the dual tax system applies and firms to which it does not applied after the tax reform (from 2004 to 2013). The tax reform applies only to firms with more than 100 million yen of capital funds, and regression (11) uses data for firms to which the dual tax system applies, while regression (12) employs data for firms to which the dual tax system does not applied. Further, regression (13) uses data for firms to which the dual tax system applies and that were not involved in a merger or corporate

break-up, while regression (14) employs data for firms to which the dual tax system does not applied and that were not involved in a merger and corporate break-up. The coefficient on the effective corporate income tax rate in regression (11) is insignificant, while in regression (12) it is positive and significant. In other words, firms to which the dual tax system applies do not take the effective corporate income tax rate into account in their relocation decisions, while firms to which the dual tax system does not apply prefer to relocate their headquarters to prefectures with high corporate income tax rates, which is counterintuitive. On the other hand, once firms that were established through a merger or corporate break-up are excluded, the results change. The coefficient on the effective corporate income tax rate in regression (13) is negative and significant, while in regression (14) it is insignificant. Firms to which the dual tax system applies avoid prefectures with a high corporate income tax rate, while firms to which the dual tax system does not applied do not take the effective tax rate into account in their relocation decision. These results imply that the impact of mergers and corporate break-ups is much larger than the impact of the tax burden and that some firms choose a prefecture as a place to relocate their headquarters even though the tax rate in the prefecture is high.

The results can be summarized as follows. Firms prefer to relocate their headquarters to prefectures that have a large population, a high per capita income, high wages, large agglomeration effects, a high population density, low land prices, and a low unemployment rate. Easy access to airport facilities as well as government expenditure also has some influence on firms' relocation decision. Whether firms were involved in a merger or corporate break-up affects the place to which they relocate. Finally, following the introduction of the dual tax system, firms avoided relocating to prefectures with a high effective corporate income tax rate.

Table 6: Estimation results: What types of firms relocate their headquarters?

	(1)			(2)			(3)			(4)			(5)		
	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.
Number of business establishments	-0.089	***	0.033	-0.079	**	0.033	-0.109	***	0.033	-0.011		0.046	-0.118	***	0.039
Number of employees	0.305	***	0.043	0.316	***	0.045	0.368	***	0.045	0.242	***	0.064	0.362	***	0.052
Number of employees at the headquarters	-0.452	***	0.021	-0.465	***	0.021	-0.422	***	0.022	-0.419	***	0.032	-0.483	***	0.023
Assets	0.257	***	0.036	0.260	***	0.037	0.116	***	0.040	0.357	***	0.050	0.180	***	0.045
Age	-0.011	***	0.002	-0.008	***	0.002	-0.009	***	0.002	-0.008	***	0.002	-0.008	***	0.002
Debt-to-assets ratio	0.758	***	0.128	0.517	***	0.130	0.521	***	0.132	0.305	*	0.181	0.636	***	0.155
Advertising-to-sales ratio	-1.221		1.468	-1.829		1.584	-2.392		1.601	-2.355		2.494	-1.506		1.863
Ratio of real estate rent to total costs	2.060	***	0.610	2.646	***	0.589	2.112	***	0.644	2.930	***	0.820	2.406	***	0.709
Ratio of payroll expenses to total costs	0.546	**	0.250	0.343		0.257	0.012		0.262	-0.228		0.393	0.687	**	0.307
Capital stock	-0.048	**	0.020	-0.064	***	0.020	-0.002		0.022	-0.117	***	0.027	-0.024		0.026
Parent company (dummy)	0.852	***	0.058	0.893	***	0.058	0.872	***	0.058	0.733	***	0.083	0.989	***	0.069
Domestic subsidiaries (dummy)	0.017		0.058	-0.021		0.059	-0.021		0.059	0.020		0.085	-0.046		0.073
Overseas subsidiaries (dummy)	0.244	***	0.073	0.277	***	0.074	0.203	***	0.074	0.155		0.108	0.358	***	0.085
Established by merger or break-up (dummy)	0.080		0.067	0.109		0.067	0.112	*	0.068	0.200	**	0.097	0.046		0.081
Construction sector (dummy)	0.373		0.250	0.163		0.250	0.188		0.250	-0.091		0.332	0.360		0.326
Manufacturing sector (dummy)	0.742	***	0.137	0.542	***	0.136	0.512	***	0.137	0.140		0.186	0.838	***	0.183
Information and communications sector (dummy)	0.399	**	0.168	0.389	**	0.168	0.279	*	0.169	0.535	**	0.220	0.243		0.230
Wholesale and retail trade sector (dummy)	-0.152		0.145	-0.346	**	0.145	-0.302	**	0.145	-0.617	***	0.200	-0.127		0.194
Real estate agencies and goods rental and leasing sector (dummy)	-0.250		0.272	-0.248		0.273	-0.214		0.272	-0.141		0.351	-0.417		0.422
Scientific and development research institutes sector (dummy)	0.264		0.234	0.289		0.234	0.218		0.233	0.073		0.350	0.472		0.301
Accommodations sector (dummy)	-0.483	*	0.263	-0.549	**	0.263	-0.621	**	0.262	-0.514		0.361	-0.532	*	0.320
Living-related and personal services sector (dummy)	-0.397		0.287	-0.338		0.288	-0.305		0.288	-0.911	*	0.484	0.011		0.327
Hokkaido (dummy)							-0.717	**	0.316						
Tohoku (dummy)							-0.090		0.198						
North Kanto (dummy)							0.635	***	0.162						
South Kanto (dummy)							0.933	***	0.139						
Hokuriku (dummy)							-0.134		0.214						
Toukai (dummy)							0.033		0.165						
Kinki (dummy)							0.869	***	0.143						
Chugoku (dummy)							0.025		0.196						
Shikoku (dummy)							0.162		0.269						
Constant	-7.904	***	0.281	-8.393	***	0.294	-8.475	***	0.318	-9.142	***	0.423	-8.994	***	0.357
Industry dummies	yes			yes			yes			yes			yes		
Year dummies	no			yes			yes			yes			yes		
Regional dummies	no			no			yes			no			no		
Observations	410,391			410,391			410,391			410,391			410,391		
Log pseudolikelihood	-11719.73			-11332.63			-11192.49			-5184.15			-7394.15		
Pseudo R2	0.058			0.089			0.100			0.079			0.091		

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 7: Estimation results: To what types of prefectures do firms relocate their headquarters?

	(6)			(7)			(8)			(9)			(10)		
	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.	Coef.		Std. err.
Effective corporate income tax rate	-0.135	*	0.075	-0.027		0.098	-0.012		0.135	0.032		0.102	-0.215	*	0.131
Population	0.819	***	0.118	1.135	***	0.174	0.509	**	0.197	1.259	***	0.193	0.648	***	0.221
Per capita income	1.331	***	0.321	1.296	**	0.510	1.429	***	0.515	1.191	**	0.564	1.060	*	0.592
Wages	0.621	*	0.354	1.385	**	0.580	0.295		0.486	1.635	**	0.638	0.122		0.539
Land prices	-0.283	***	0.048	-0.625	***	0.098	-0.227	***	0.086	-0.641	***	0.106	-0.260	***	0.096
Number of firms in the same industry	0.541	***	0.069	0.472	***	0.115	0.716	***	0.096	0.365	***	0.124	0.704	***	0.109
Price of electricity	0.046		0.441	1.904	**	0.769	-0.733		0.620	2.744	***	0.834	-0.916		0.684
Unemployment rate	-0.081	**	0.038	-0.096	*	0.057	-0.052		0.067	-0.124	**	0.063	-0.091		0.073
Population share of young people	-1.411		3.512	2.093		5.244	-6.478		6.867	6.019		5.687	-10.911		7.219
Population density	0.265	***	0.050	0.283	***	0.070	0.228	***	0.084	0.319	***	0.075	0.259	***	0.092
Share of international flights	5.712	***	0.724	4.564	***	1.042	5.913	***	1.225	4.801	***	1.148	6.078	***	1.337
Share of foreign passengers	-5.541	***	0.669	-4.511	***	0.963	-5.615	***	1.124	-4.820	***	1.058	-5.744	***	1.231
Per capita public investment	0.193	*	0.104	0.411	**	0.162	0.149		0.185	0.398	**	0.181	0.369	*	0.207
Per capita public debt	-0.362	***	0.117	-0.219		0.181	-0.593	***	0.179	0.001		0.197	-0.721	***	0.197
Per capita expenditure on public education	0.396		0.533	-0.202		0.727	0.204		0.982	-0.639		0.789	0.344		1.090
Distance	-0.009		0.012	-0.017		0.017	0.001		0.017	-0.022		0.018	-0.012		0.019
Observations	117,641			62,557			55,084			51,982			44,791		
Log pseudolikelihood	-7248.18			-3853.66			-3298.56			-3200.85			-2702.63		
Pseudo R2	0.270			0.268			0.280			0.268			0.273		

Note: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 8: Estimation results: To what types of prefectures do firms relocate their headquarters?

	(11)		(12)		(13)		(14)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Effective corporate income tax rate	-0.105	0.149	0.662 **	0.298	-0.296 *	0.177	0.275	0.284
Population	0.653 **	0.253	0.299	0.313	0.836 ***	0.282	0.408	0.354
Per capita income	2.306 ***	0.671	0.139	0.799	2.156 ***	0.765	-0.514	0.918
Wages	0.068	0.649	0.604	0.750	-0.219	0.688	0.555	0.870
Land prices	-0.449 ***	0.110	0.075	0.139	-0.485 ***	0.124	0.055	0.156
Number of firms in the same industry	0.719 ***	0.124	0.732 ***	0.158	0.736 ***	0.138	0.657 ***	0.180
Price of electricity	-1.688 **	0.777	0.568	1.001	-1.703 *	0.873	0.200	1.088
Unemployment rate	-0.011	0.088	-0.119	0.101	-0.057	0.097	-0.155	0.112
Population share of young people	-16.217 *	9.568	4.680	9.676	-19.791 **	9.708	-1.469	10.640
Population density	0.254 **	0.113	0.186	0.129	0.257 **	0.122	0.260 *	0.144
Share of international flights	4.728 ***	1.543	7.369 ***	2.010	5.988 ***	1.750	6.035 ***	2.132
Share of foreign passengers	-4.853 ***	1.409	-6.433 ***	1.854	-6.011 ***	1.608	-5.200 ***	1.968
Per capita public investment	0.019	0.237	0.404	0.293	0.217	0.271	0.626 *	0.321
Per capita public debt	-0.619 ***	0.207	-0.613 *	0.335	-0.819 ***	0.237	-0.631 *	0.346
Per capita expenditure on public education	-0.380	1.283	0.720	1.537	0.409	1.440	0.071	1.678
Distance	0.082 ***	0.024	-0.102 ***	0.022	0.065 **	0.026	-0.106 ***	0.025
Observations	34,921		20,163		27,542		17,249	
Log pseudolikelihood	-1999.99		-1264.31		-1605.76		-1071.86	
Pseudo R2	0.313		0.242		0.300		0.247	

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively

5. Conclusion

This paper examined the effects of the introduction of the dual tax system on firms' relocation decisions. The analysis is based on the "Basic Survey of Japanese Business Structure and Activities" and examined the following two questions based on a discrete choice model: What types of firms relocate their headquarters across prefectures, and to what types of prefecture do firms prefer to relocate their headquarters? The effects of the dual tax system were also investigated.

The results indicated that firms that are young, have a large number of employees, a large amount of assets, a high debt-to-assets ratio, pay large real estate rental costs and have large payroll expenses, a smaller number of business establishments, fewer employees at their headquarters, and less capital stock are more likely to relocate their headquarters. Moreover, firms with a parent company, an overseas subsidiary, fewer business establishments are more likely to relocate. Firms relocate their headquarters to Tokyo or Osaka based on considerations of business efficiency and/or as a result of corporate restructuring through mergers and corporate break-ups. On the other hand, firms relocate their headquarters to other prefectures to reduce payroll and real estate rental costs. Firms prefer to relocate their headquarters to prefectures that have a large population, a high per capita income, high average wages, large agglomeration effects, a high population density, low land prices, a low unemployment rate, good airport facilities, and a large amount of government expenditure. Whether firms were involved in a merger or corporate break-up also affected the probability of whether their headquarters were relocated as well as the place of relocation. After the introduction of the dual tax system, firms avoided relocating to prefectures with a high effective corporate income tax rate.

The analysis provides two polices implications. First, following the introduction of the dual tax system, firms' response to effective corporate income tax rates was more sensitive than before and firms avoided relocating to prefectures with a high effective tax rate even though prefectural governments rarely changed their tax rates. This result implies that once prefectural governments obtain more taxation autonomy, tax competition will occur. If the Japanese government proceeds with decentralization, it should avoid providing tax autonomy of the tax items that encourage tax competition among prefectural governments. Second, some firms that relocate their headquarters to prefectures other than Tokyo and Osaka aim to reduce real estate rental and payroll costs. To attract firms, prefectural governments need to provide firms with a business environment that allows them to keep their costs low and easy access to skilled workers. They also need to ensure the soundness of public finances.

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Appendix

Table A.1 Description of variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Number of business establishments (log)	410,391	1.658	1.203	0.000	8.402
Number of employees (log)	410,391	5.267	1.030	3.912	11.941
Number of employees at the headquarters (log)	410,391	4.217	1.148	0.000	10.804
Assets（log）	410,391	8.440	1.379	1.792	16.533
Age（log）	410,391	41.85	18.74	0.000	297.00
Debt-to-assets ratio	410,391	0.667	0.224	0.000	1.000
Advertising-to-sales ratio	410,391	0.007	0.019	0.000	0.794
Ratio of real estate rent to total costs	410,391	0.021	0.031	0.000	0.958
Ratio of payroll expenses to total costs	410,391	0.180	0.128	0.000	1.000
Capital stock (log)	410,391	6.823	1.831	0.000	16.309
Parent company (dummy)	410,391	0.344	0.475	0.000	1.000
Domestic subsidiaries (dummy)	410,391	0.428	0.495	0.000	1.000
Overseas subsidiaries (dummy)	410,391	0.171	0.377	0.000	1.000
Established by a merger or break-up (dummy)	410,391	0.128	0.334	0.000	1.000

Table A.2 Data source of variables

Variable	Data source
Effective corporate income tax rate	Local Tax Bureau of the Ministry of Internal Affairs and Communications, “Hojinjuminzei Hojinjigyozei Zeiritsu Ichiranhyo”
Population	Cabinet Office, Government of Japan, “Kenmin Keizai Keisan Nenpo”
Per capita income	Cabinet Office, Government of Japan, “Kenmin Keizai Keisan Nenpo”
Wages	The Japan Institute for Labor Policy and Training
Land prices	Nikkei Needs
Number of firms in the same industry	Statistics Japan, “Keizai Census”
Price of electricity	Statistics Japan, “Kouri Bukka Tokeit Chosa”
Unemployment rate	Nikkei Needs
Population share of young people	Statistics Japan, “Jinko Suikei”
Population density	Nikkei Needs
Share of international flights	Obtained from the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism
Share of foreign passengers	Obtained from the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism
Per capita public investment	Ministry of Internal Affairs and Communications, “Chiho Zaisei Tokei Nenpo”
Per capita public debt	Ministry of Internal Affairs and Communications, “Chiho Zaisei Tokei Nenpo”
Per capita expenditure on public education	Ministry of Internal Affairs and Communications, “Chiho Zaisei Tokei Nenpo”
Distance	Obtained from the website of the Geospatial Information Authority of Japan

Table A.3 Description of variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Effective corporate income tax rate	117,641	0.308	0.195	0.000	0.514
Population	117,641	14.498	0.738	13.274	16.398
Per capita income	117,641	7.921	0.142	7.575	8.558
Wages	117,641	8.411	0.152	7.725	9.158
Land prices	117,641	7.248	1.024	5.086	10.551
Number of firms in the same industry	117,641	8.120	1.227	0.693	11.405
Price of electricity	117,641	9.076	0.088	8.897	9.278
Unemployment rate	117,641	3.997	1.129	1.700	10.262
Population share of young people	117,641	0.147	0.016	0.111	0.221
Population density	117,641	5.847	0.961	4.181	8.746
Share of international flights	117,641	0.050	0.143	0.000	0.958
Share of foreign passengers	117,641	0.066	0.165	0.000	1.000
Per capita public investment	117,641	4.682	0.624	2.653	5.882
Per capita public debt	117,641	3.938	0.449	2.627	5.062
Per capita expenditure on public education	117,641	4.612	0.163	4.190	5.039
Distance	117,641	5.707	1.207	0.000	7.716