Chapter 2
Corporate Taxation and Regional Economic Development in Japan: A Panel Analysis of Prefectural-Level Data

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Abstract Japan's Business Location Promotion Law was enacted with the aim of revitalizing regional economies through decentralized industrial growth. This paper analyzes the effect of corporate tax policy—modeling tax burden as the marginal effective tax rate (METR) at the prefectural level—on regional economic development by estimating its impact on firms' decisions about where to locate new facilities. The key findings can be summarized as follows: (1) The effect of corporate taxation on regional economic development—modeled as employment in the manufacturing sector—is significantly negative at the national level. However, when the country is split into two categories—Japan's three major metropolitan areas versus all other prefectures ("provincial regions")—the effect is not statistically significant in either category. (2) Several independent variables unrelated to tax burden also influence regional economic development. Notably, market characteristics—modeled as population size—has a significantly positive effect both at the national level and separately within each regional category. The nationwide model indicates that the effect of market characteristics is considerably larger than that of corporate taxation. (3) The public service of highway infrastructure has a significantly positive impact on manufacturing employment within Japan's three major metropolitan areas.

2.1 Introduction

Japan's industrial location policies have reached an inflection point, influenced by economic and social changes in the twenty-first century, such as globalization, population decline, and decentralization. Their emphasis "has shifted from the decentralization of industrial and other functions to focusing on the independence of regional economies, the creation of new internationally competitive industries, and industrial

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agglomeration."[1] Japan's manufacturing sector was singled out for support in the Business Location Promotion Law enacted in 2007[2]: by encouraging firms to locate new facilities in ways that take advantage of regional characteristics and strengths, it aimed to revitalize local economies through the creation of advanced industrial clusters. Since 2017, this Law has been partially amended and joined by the Regional Future Investment Promotion Law.[3] This piece of legislation was also intended to promote regional economic development, but with a much broader scope, targeting regional economic advancement projects by companies in a wide range of sectors beyond manufacturing.

Both pieces of legislation provide financial support towards these goals in the form of tax incentives. For example, companies can claim special depreciation or tax credits on corporate income tax, as well as reductions or exemptions for fixed property tax and real estate acquisition tax. In addition, when local governments reduce or exempt companies' property tax (municipal) or real estate acquisition tax (prefectural) under the terms of the laws, they are eligible to receive subsidies from the national government (funded by the "local allocation tax") for a specified period to help compensate for the resulting revenue shortfall.

Such tax incentives and allocations to local governments are certainly ambitious, and their effectiveness in advancing their stated goals deserves close attention; however, quantifying such effects can prove challenging. This study utilizes an econometric model to examine the effect of corporate tax policy on regional economic development in Japan via its impact on industrial location decision making since the enactment of the Business Location Promotion Law. Location decisions shall be framed as choices between prefectures, rather than cities or towns. The chief focus shall be the manufacturing industry, with sector-specific employment adopted as an indicator of local economic development. This study is expected to contribute uniquely to the literature due to both the dearth of quantitative analyses of the effects of the Japanese tax system on regional economic development among previous works (see Sect. 2.1) and its methodology of estimating firms' marginal effective tax rates to represent tax burden.

The rest of the paper is organized as follows. Section 2.1 reviews previous analyses of the impacts of taxation on regional economic development. Section 2.2 details the methodology of our econometric model, the results of which are presented in Sect. 2.3.

[1] Matsubara and Kamakura (2020), p. 219.

[2] Act on Formation and Development of Regional Industrial Clusters through Promotion of Establishment of New Business Facilities.

[3] Act on Strengthening a Framework for Regional Growth and Development by Promoting Regional Economy Advancement Projects.

2.2 Literature Review

Numerous studies have analyzed the impacts of taxation on business location and regional economic development, among which survey research has been a particularly fertile and active subfield. In a pioneering literature review, one of the first to address the question of taxation and business location, Due (1961) presented several common conclusions of previous studies on the topic: (1) tax effects are not an important determinant of location decisions; (2) state/local taxes *are* an important factor to consider when deciding between locations within a metropolitan area; however, since they represent such a small percentage of total costs, their influence is negligible; and (3) the effect of regional differences in tax regimes on location decision making is minimal.[4]

Due's work served as inspiration for a series of successive surveys, including some focused on the results of published econometric models; notable examples include Oakland (1978), Wasylenko (1981, 1985, 1997), Newman and Sullivan (1988), Bartik (1991, 1992), and Hanson (2019). With the exception of Hanson (2019), each review focused on the impact of local taxes on business activity and regional economic development and can be categorized as comparing trends either within a specific region (urban areas), between different regions (states or urban areas), or in both respects. Each survey shall be briefly summarized in the paragraphs below, but broadly speaking, they commonly found (1) local tax burden to have a significantly negative impact on regional economic development and (2) tax differences within a given region to influence business location decisions to a greater extent than such differences between different regions. Despite their differences from Due (1961), by acknowledging that other factors have considerably larger effects than taxation, they essentially reached the same conclusion.

Examining several studies from the 1960s and 1970s focused on local taxes' impact on business location inside metropolitan areas, Oakland (1978) concluded that the field was still too immature to estimate the effects of taxation for several reasons: (1) the methods used in such analyses needed further refinement; (2) more empirical evidence derived from econometric model-based research needed to be collected; and (3) such models still needed to incorporate the behavior of local governments on the supply side, e.g., providing businesses with industrial land.

Reviewing the empirical analyses within metropolitan areas and between states conducted since Oakland (1978), Newman and Sullivan (1988) noted that while many of them expressed skepticism toward the conventional view that taxation's effects on business location decision-making are inconsequential, none ultimately reached solid conclusions in that respect.

Focusing exclusively on studies from the 1980s, Bartik (1991, 1992) noted that although researchers disagreed on the impact of local taxes on regional economic development, most had moved away from the traditional view that they had no significant effects at all. Second, these effects were more conspicuous within a given metropolitan area than between metropolitan areas or between states.

[4] See Due (1961), p. 171.

Following in Bartik's footsteps, Wasylenko (1997) classified previous econometric analyses by whether they examined the effects of taxation between different regions versus within a particular region.[5] Within each category, studies were further classified by the dependent variable chosen to represent regional economic development: macro indicators, such as income, employment, and investment, versus micro indicators, such as factory expansions, relocations, and births. In this framework, he identified large differences between regions unrelated to taxation, such as in market and cost characteristics; however, tax differentials were typically reduced by measures taken by local governments to close the gap with their neighbors. Thus, while the effects of taxation on economic activity were significant in a statistical sense, they were minor in terms of degree. Within a specific region, conversely, smaller differences in non-tax factors acted to amplify proportionally the effects of taxation on economic activity in this scenario. Similar conclusions were drawn in previous works by the same author (1981; 1985).

In a recent working paper, Hanson (2019) noted that in parallel with developments in the field of micro-econometrics, natural experiment approaches have become mainstream in econometric research since the era in which the econometric research covered by Wasylenko (1997) was conducted. His paper summarized and reviewed a host of studies on how regional economic development is influenced by taxation, separately examining each of the following: property taxes/incentives, spatially targeted and zone-based tax concessions, business-specific incentives (subsidies), and corporate income taxes. Hanson concluded by arguing that a policy shift away from property tax incentives and towards lower corporate income tax rates and measures to promote investment would be needed to steer regional economic development in the right direction.

The publications discussed above are representative of research trends outside of Japan. The paragraphs below shift focus to domestic research into taxation's relationship with regional economic development. Several econometric analyses of the determinants of industrial location have been conducted in Japan, including Gaku (2000), Ogawa and Ishida (2013, 2016), and Takao et al. (2018), but only a few have examined the impact of taxation. Gaku (2000) clarified the effects of the government's tax-financed regional policies on industrial location using dummy variables, representing whether or not a prefecture was designated as eligible under each of the three laws passed for that purpose (the Industrial Development in Underdeveloped Regions Promotion Law, New Industrial City Construction Promotion Law, and Industrial Relocation Promotion Law). Despite the insights yielded, his analysis did not extend to the effects of taxation. Fuzisawa (2012) showed that industrial location incentives (tax cuts, credits, subsidies, loans, etc.) are a determinant of corporate decision-making in this regard, modeling their effects using policy dummy variables at the municipal level. Nakata (2016) analyzed how pro forma standard taxation, a corporate enterprise tax introduced in 2004, changed company behaviors related

[5] In the Japanese context, an inter-region analysis would compare trends in different prefectures, while an intra-region analysis would compare trends between different municipalities within a specific prefecture.

to headquarters relocation. She found that the new system had made firms more sensitive to concerns about the effective corporate tax rate, which made them avoid regions with high rates as relocation destinations.

2.3 Methodology

2.3.1 Model

This study modeled the fixed effects of independent variables according to the following estimation equation:

$$Y_{it} = \beta_i X_{1it} + \cdots \beta_k X_{kit} + \alpha_i + \lambda_t + u_{it}$$

where Y_{it} is the value of the dependent variable for individual i at time t; X_{kit} is the value of the kth independent variable individual i at time t ($i = 1, \ldots, N$; $t = 1, \ldots, T$), α_i is an individual-specific constant term (fixed effect), λ_t is a time effect, and u_{it} is an error term.

The estimation period spanned 20 years in total, consisting of four yearlong periods separated by a five- or four-year[6] interval (2005, 2010, 2015, 2019). Endogeneity bias was addressed by implementing one period of lag, utilizing independent variable data from the year before the corresponding dependent variable data (2004, 2009, 2014, 2018). National census data were the only exception: while sampled at five-year intervals, data were only available for the years in which the census was conducted (2000, 2005, 2010, 2015). Elasticity values were calculated based on log-transformed variable data. Data from all 47 prefectures were analyzed in a nationwide model, as well as two region-specific models: an "metropolitan" regional model consisting of Japan's three major metropolitan areas—Tokyo, Nagoya, Osaka, and neighboring prefectures[7]—and a "provincial" regional model covering all prefectures outside those three areas.

[6] The four-year interval was chosen (i.e., 2019 was selected instead of 2020) because at the time during which the study was performed, 2018 was the latest year for which real capital stock data were available needed to estimate the METR.

[7] In Japan, "the three major metropolitan areas" (*san-daitoshi-ken*) refers to the three largest metropolises in the country and their neighboring prefectures, which are heavily urbanized with interconnected economies, i.e., the Tokyo Metropolitan Area (Tokyo, Kanagawa, Saitama, Chiba, Ibaraki), the Nagoya Metropolitan Area (Aichi, Gifu, Mie), and the Osaka Metropolitan Area (Osaka, Hyogo, Kyoto, Nara, Wakayama). Government data collected since 2000 indicated that businesses are increasingly choosing to locate new factories in these three giant conurbations (2000: 27.2%, 2005: 34.3%, 2010: 37.3%, 2015: 40.0%, 2020: 42.6%; Survey of Factory Location Trends, METI).

2.3.2 Variable Selection

(1) Dependent variable

Regional economic development can be quantified using macro-indicators, such as income, employment, and investment, and/or micro-indicators, such as factory expansions, relocations, and births.[8] This paper adopted employment as the dependent variable, defining it as the number of workers employed in the manufacturing sector.

(2) Independent variables

To examine the impact of corporate taxation on regional economic development via its influence over industrial location decision-making, numerous relevant factors were considered as candidate explanatory variables. These regressors were chosen with reference to the results data of an annual business survey, in which respondents endorsed specific reasons for their business location decisions, as well as previous econometric analyses of business location and economic development.

(1) Business survey data

Conducted annually since 1962, the *Survey of Factory Location Trends* targets businesses in the manufacturing, electricity, gas, and heating industries that have acquired land of 1,000 m^2 or more for the purpose of constructing factories or research facilities. Roughly 1,300 businesses participate in the survey, and results are published separately by industry and prefecture. Businesses rate 18 factors by their importance in their decision criteria for locating in the prefecture(s) that they chose, categorizing them as "critical" or "secondary" reasons; any number of reasons can be selected.

The top 10 reasons endorsed by businesses for new factory location during the estimation period are ranked in Table 2.1. For scoring, a reason marked "critical (secondary)" is awarded 1.0 (0.5) points for each business endorsing it. These factors can be broadly classified under the price/availability of production inputs (land prices, access to human resources/labor force, ease of procuring raw materials, etc.), transportation infrastructure (highway access), agglomeration advantages (proximity to headquarters/other company-owned plants, site of the industrial park, proximity to affiliated companies), market access (proximity to markets), environment (few restrictions from the surrounding environment), and government support (sincerity/proactivity/responsiveness of local government, national/local government subsidies). Thus framed, the prices/availability of production inputs and agglomeration advantages clearly rank among the most important considerations for new factor location.

[8] See Wasylenko (1997), p. 39.

Table 2.1 Japanese survey data on factors influencing business decisions about new factory locations: reasons by rank (all industries)

Rank	2007	2011	2016	2021
1	Proximity to headquarters/other company-owned plants (270)	Proximity to headquarters/other company-owned plants (157)	Proximity to headquarters/other company-owned plants (203.5)	Proximity to headquarters/other company-owned plants (155.5)
2	Site of industrial park (216)	Site of industrial park (95)	Land prices (102)	Land prices (65)
3	Land prices (208)	Land prices (85)	Site of industrial park (96)	Site of industrial park (64)
4	Few restrictions from the surrounding environment (157.5)	Proximity to markets (77)	Access to human resources/labor force (76)	Proximity to affiliated companies (51.5)
5	Proximity to affiliated companies (142.5)	Proximity to affiliated companies (75)	Few restrictions from the surrounding environment (74.5)	Access to human resources/labor force (48.5)
6	Access to human resources/labor force (133.5)	Access to human resources/labor force (72)	Proximity to markets (71.5)	Proximity to markets (44.5)
7	Proximity to markets (110.5)	Few restrictions from the surrounding environment (70)	National/local government subsidies (71)	Highway access (41.5)
8	National/local government subsidies (105.5)	Ease of procuring raw materials, etc. (60)	Highway access (37.5)	Few restrictions from the surrounding environment (32.5)
9	Sincerity/proactivity/responsiveness of local government (98.5)	Sincerity/proactivity/responsiveness of local government (56)	Proximity to affiliated companies (62.5)	National/local government subsidies (31.5)
10	Ease of procuring raw materials, etc. (77.5)	National/local government subsidies (54.5)	Sincerity/proactivity/responsiveness of local government (51)	Ease of procuring raw materials, etc. (31)

Note Numbers in parentheses denote each reason's score
Source Prepared from data in *Survey of Factory Location Trends* (Ministry of Economy, Trade and Industry)

(2) Econometric model

The dependent and independent variables often used in past econometric models of economic development and business location are compiled in Table 2.2. The representative works shown include Plaut and Pluta (1983)'s study of industrial growth and Wasylenko (1997)'s review of econometric models of economic development. Wasylenko (1981) and Arauzo-Carod et al. (2009) surveyed a number of published econometric models of industrial location, specifically focusing on their selection of explanatory variables. Japanese studies of factory location are represented by Gaku (2000) and Ogawa and Ishida (2013, 2016).

The explanatory variables surveyed in Table 2.2 are re-organized in Table 2.3 according to different criteria.[9] They can be divided into non-fiscal and fiscal variables; the former can be subdivided into economic and non-economic factors. Economic factors consist of cost characteristics and market characteristics, based on the assumption that firms seek to maximize profits.

The following variables were regarded as cost characteristics: access to markets, prices and availability/productivity of production inputs, transportation infrastructure, agglomeration advantages (economic/industrial agglomeration), distance from headquarters, and information/travel costs.[10] Economic agglomeration can take two forms: economies of urbanization and economies of regional specialization. The former refers to "economic benefits that arise when a large number of stakeholders not exclusively within a particular sector or industry locate in the same area," while the latter refers to "economic benefits that arise when companies in the same sector or industry cluster in a particular area."[11] Since both economies of regional specialization and industrial agglomeration involve the effects of the concentration of the same industry, the two terms can be used interchangeably.

Different market characteristics have relevance to the suppliers of intermediate goods and those of final (consumer) goods. While demand for intermediate goods depends on the number of customers (i.e., local businesses) in need and their degrees of need, demand for the final goods is more dependent on demographic and socioeconomic factors (per capita income level, population size, and density, etc.). Both types of demand, however, are influenced by the numbers of competing suppliers.[12]

Non-economic factors include worker education level and living and business environments.[13] In the case of small firms, the personal preferences of management also influence location decisions.

Fiscal variables include taxation, public services, government incentives (tax cuts/credits, subsidies, loans), and environmental regulations.

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[9] This categorization scheme was drawn exclusively from the works of Wasylenko (1981, 1997).

[10] It stands to reason that information and travel costs would consume a greater percentage of earnings for smaller enterprises, which may be one reason why small business owners may limit their options to familiar areas. See Wasylenko (1981), p. 160.

[11] See Fukazawa (2020), p. 43.

[12] See Wasylenko (1981), p. 157.

[13] Technology-intensive industries tend to locate preferentially in areas with higher population densities and higher levels of worker education. Arauzo-Carod et al. (2009), p. 703.

Table 2.2 Economic development and industrial location-related variables in past econometric modeling research

	Dependent variable	Independent variables	
		Non-fiscal	Fiscal
Plaut and Pluta (1983)	Industrial growth (percent changes in real value added, employment, real capital stock)	· Market access · Prices of production inputs (wages, land, raw materials, energy) · Availability/productivity of production inputs (unemployment rate, labor union activities, labor productivity) · Climate and living environment · Business environment	· Taxation · Public services
Wasylenko (1997)	Economic development (income, employment, investment, factory expansions, relocations, and births)	· Wages · Energy prices · Presence of labor unions/protection laws · Economic agglomeration · Market size (population size, per capita income level)	· Taxation · Public services
Wasylenko (1981)	Industrial location	· Market characteristics (per capita income, population size, etc.) · Cost characteristics (wages, equipment costs, land prices, transportation costs, economic agglomeration, energy prices, information/travel costs) · Personal preferences of business owners (climate, commute time, etc.)	· Taxation · Public services · Government incentives (tax cuts/credits, subsidies, loans)
Arauzo-Carod et al. (2009)	Industrial location	· Economic agglomeration · Transport infrastructures · Wages · Education level · Population density · Market characteristics · Personal preferences of business owners	· Taxation · Public services · Government incentives for new businesses · Environmental regulations

(continued)

Table 2.2 (continued)

	Dependent variable	Independent variables	
		Non-fiscal	Fiscal
Gaku (2000)	Industrial location (no. of manufacturing plants by prefecture)	· Wages · Land prices · Economic agglomeration · Industrial agglomeration	Government policies encouraging local plant location (dummy variable for policy-designated regions)
Ogawa and Ishida (2013, 2016)	Industrial location (no. of manufacturing plants by prefecture)	· Industrial agglomeration · Prices of production inputs (wages, land) · Factory worker availability; access to sophisticated technical professionals · Infrastructure · Distance from headquarters	–

Source Prepared by the author

Given the above, the following variables were incorporated into the models as independent variables. Four non-fiscal variables categorized as cost characteristics were incorporated: real wages, land prices (i.e., production inputs), and two types of agglomeration advantages. Economic agglomeration was modeled as employment density (number of employees per km^2); industrial agglomeration was modeled as establishment density (number of manufacturing sites per km^2). For market characteristics, population size was used due to its correlation with local demand. One non-economic factor was included—worker education level—which was modeled using the education expenditures of local government as a proxy variable.

Two kinds of fiscal variables were incorporated into the model: taxation (i.e., tax burden) and public services. Same as in Papke (1991), taxation was operationalized as the *marginal effective tax rate* (METR), an indicator of the extent to which real costs of capital are increased by tax burden. The METR was estimated according to Eq. (2.1) below, where *ucc* represents the real cost of capital under the tax system, and r denotes the real interest rate.[14] Equation (2.2) was used to calculate *ucc* (A: present discounted value of the preferential treatment of investments, ρ: discount rate, δ: economic depreciation rate, π: inflation rate). This formula also accounted for taxation on corporate income at rate τ (i.e., combined corporate income, inhabitant, and enterprise taxes), as well as excluding deductible corporate fixed asset taxes W_c from the corporate taxation base.

$$\text{METR} = \frac{ucc - r}{ucc} \tag{2.1}$$

[14] For detailed information on how the METR is defined, see Devereux (2003), p. 7.

Table 2.3 Independent variable classification

		Non-fiscal variables	Fiscal variables
Economic factors	Cost characteristics	· Market access · Production inputs: Prices (wages, land, energy, etc.) · Production inputs: Availability/productivity (workforce availability, presence of labor unions/protection laws, labor productivity) · Transport infrastructures · Agglomeration advantages (economic agglomeration, industrial agglomeration) · Distance from headquarters · Information costs · Travel costs	· Taxation · Public services · Government incentives (tax cuts/credits, subsidies, loans) · Environmental regulations
	Market characteristics	· Demand for intermediate goods; number of competing producers · Demand for final goods (per capita income level, population size, population density); number of competing producers	
Non-economic factors		· Worker education level · Environment (living environment) · Personal preferences of business owners (in the case of small firms)	

Source Prepared by the author

$$ucc = \frac{1}{1-\tau}\{(1-A)(\rho+\delta-\pi)+(1-\tau)W_c\}-\delta \tag{2.2}$$

τ is the effective corporate tax rate: the rate until 2007 was calculated using Eq. (2.3); the rate from 2008, when Japan introduced the special local corporation tax, and

Table 2.4 Tax rate for corporate taxation in Japan

	Corporate inhabitant tax (per corporate income tax basis)		Corporate enterprise tax		Corporate income tax (basic rate) (%)	Special local corporation tax (%)
	Standard tax rate	Higher rate than standard tax rate	Standard tax rate	Higher rate than standard tax rate		
2004	1 5%	46 (5.8%, 6%)	40 9.6%	7 (9.888%, 10.08%)	30	–
2009	1 5%	46 (5.8%, 6%)	39 5.3%	8 (5.588%, 5.78%)	30	4.3
2014	1 5%	46 (5.8%, 6%)	39 5.3%	8 (5.588%, 5.777%, 5.780%)	25.5	2.9
2018	1 3.2%	46 (4%, 4.2%)	39 6.7%	8 (6.988%, 7.169%, 7.18%)	23.2	2.9

Note (1) Numbers reflect the total number of organizations subject to the tax that year
(2) Percentages reflect official rates as of April 1st of the corresponding year
Source Prepared from data in *Handbook on Local Taxes* (Panel on Local Tax Affairs (eds.)) and *Trends in Corporate Tax Rates* (Ministry of Finance)

onwards was calculated using Eq. (2.4).[15] Rate and tariff schedules for each type of corporate tax are provided in Table 2.4. Corporations having capital stock of less than 100 million yen are not subject to pro forma standard taxation,[16] but are subject to the corporate enterprise tax at a higher rate than the standard tax rate, as well as the special local corporation tax. W_c is the effective rate for fixed property tax and was calculated using Eq. (2.5). The denominator term—gross nominal capital stock—is the nominally adjusted value of the indicator "real net capital stock by prefecture (excluding intellectual property products)" listed in the *R-JIP Database 2021* (Research Institute of Economy, Trade and Industry). The numerator term—the assessment value of corporate depreciable fixed assets—is the tax basis of the corporate depreciable assets listed in the *Statistical Report on Value of Fixed Assets* (Ministry of Internal Affairs and Communications).

[15] See Nakata (2016), p. 7.

[16] Since FY2004, ordinary corporations with capital exceeding 100 million yen are subject to pro forma standard taxation (a.k.a. "size-based corporate taxation"), which consists of a value-added levy (based on total remuneration plus net interest/rent expenses) and a capital levy (based on total capital stock, etc.), in addition to an income levy (based on corporate income). Roughly 1% of all corporate entities in Japan are subject to pro forma standard taxation.

$$\tau = \frac{Corporate\,Tax\,Rate \times (1 + Prefectural\,Inhabitant\,Tax\,Rate) + Corporate\,Enterprise\,Tax\,Rate}{1 + Corporate\,Enterprise\,Tax\,Rate} \tag{2.3}$$

$$\tau = \frac{\text{Corporate Tax Rate} \times (1 + \text{Prefectural Inhabitant Tax Rate}) + \text{Corporate Enterprise Tax Rate} \times (1 + \text{Special Local Corporate Tax Rate})}{1 + \text{Corporate Enterprise Tax Rate} \times (1 + \text{Special Local Corporate Tax Rate})} \tag{2.4}$$

$$W_c = \frac{Assessment\,Value\,of\,Corporate\,Depreciable\,Fixed\,Assets \times Fixed\,Property\,Tax\,Rate\,(1.4\%)}{Gross\,Nominal\,Capital\,Stock} \tag{2.5}$$

Discount rate ρ was derived as $\rho = (1 - \tau)i$, assuming that companies self-finance with debt at nominal interest rate i.[17]

One phenomenon that deserves special attention when examining the effects of taxes is how differences in the METR between regions are reflected in land prices. If one area has a higher (lower) METR than other areas, land prices there will fall (rise) in accordance with the expected future tax burden. In the case of complete capitalization, the effects of taxes are offset by change in land prices. Complete capitalization was not assumed in this analysis, but both taxation and land prices were included as explanatory variables.[18]

Public services act as a kind of synergistic production input, with high-quality services increasing production levels by lowering firms' costs while increasing the productivity of labor and other factors. It thus seems reasonable to assume that companies take local public services into account when selecting new factory locations. Furthermore, since public services are financed by tax revenues, their impacts must be considered alongside that of taxation to estimate the latter accurately. Even heavy tax burdens can benefit companies on balance if they gain value from the public services thus financed, a good example of why the effect of taxes on regional economic development is not always negative.[19]

In their reviews of previous studies examining the impact of local public services on business location and economic development, Bartik (1991) and Fisher (1997) showed that those related to transportation, public safety (police and fire), and education are most likely to have positive effects. Given their importance, three public service-related variables were included in the present analysis: public safety expenditures, highway infrastructure, and education expenditures. The second factor was operationalized as the number of kilometers of Japan's National Expressway within the prefecture ("real highway length" below). Public safety and education expenditures were considered jointly with spending at the municipal level and analyzed as a percentage of each prefecture's total annual expenditures.

The independent variables described in the paragraphs above were hypothesized to have contrary effects on factory location decisions. Since real wages, land prices, and

[17] For details on how the present discounted value of the preferential treatment of investments A, discount rate ρ, and economic depreciation rate δ are estimated, see Iwata et al. (1987).

[18] If land price (LP) were not included in the regression model, the value of the coefficient for the METR (TAX) would reflect the net effect excluding capitalization.

[19] Gabe and Bell (2004) identified an important trade-off in fiscal policy in this regard: when municipalities seeking economic growth try to attract businesses by cutting taxes, public services suffer as a consequence, which dampens economic growth in turn.

tax burden act as costs from a business perspective, they were expected to have negative effects. Conversely, agglomeration advantages (both economic and industrial), market characteristics (which reflect demand), and public services were expected to have positive impacts.

2.4 Data

(1) Statistics used

Definitions of the variables used in the study model are presented in Table 2.5, along with the respective data sources.

Table 2.5 Variable definitions and data sources

Dependent variable		
Variable	Definition	Data source
Number of workers (WORKER)	No. of employees in manufacturing industry	*Statistical Survey on Corporate Performance and Business Establishment* (Statistics Bureau, Ministry of Internal Affairs and Communications) *Economic Census* (Statistics Bureau, Ministry of Internal Affairs and Communications)
Independent variables		
Non-fiscal	Definition	Data source
Real wages (RW)	Real wages in manufacturing industry	*Basic Survey on Wage Structure* (Ministry of Health, Labor and Welfare) *Social Indicators by Prefecture* (Statistics Bureau, Ministry of Internal Affairs and Communications)
Land prices (LP)	Average price of land (all categories)	*Survey of Factory Location Trends* (Ministry of Economy, Trade and Industry)
Economic agglomeration (EA)	Employment density (no. of employees per km^2)	*Statistical Survey on Corporate Performance and Business Establishment* (Statistics Bureau, Ministry of Internal Affairs and Communications) *Economic Census* (Statistics Bureau, Ministry of Internal Affairs and Communications) *Planimetric Reports by Prefectures and by Municipalities* data (Geospatial Information Authority of Japan)
Industrial agglomeration (IA)	Establishment density (no. of manufacturing sites per km^2)	*Statistical Survey on Corporate Performance and Business Establishment* (Statistics Bureau, Ministry of Internal Affairs and Communications) *Economic Census* (Statistics Bureau, Ministry of Internal Affairs and Communications) *Planimetric Reports by Prefectures and by Municipalities* data (Geospatial Information Authority of Japan)

(continued)

Table 2.5 (continued)

Dependent variable		
Variable	Definition	Data source
Market characteristics (MC)	Population size	*National Census* (Statistics Bureau, Ministry of Internal Affairs and Communications)
Fiscal	Definition	Data source
Taxation (TAX)	METR (marginal effective tax rate)	*Special Report on Survey of Corporate Performance* (Policy Research Institute, Ministry of Finance) *Statistical Report on Value of Fixed Assets* (Ministry of Internal Affairs and Communications) *Handbook on Local Taxes* (Panel on Local Tax Affairs (eds.)) *Trends in Corporate Tax Rates* (Ministry of Finance) *R-JIP Database 2021* (Research Institute of Economy, Trade and Industry) *Annual Report on National Accounts* (Economic and Social Research Institute, Cabinet Office) *Average Contractual Interest Rates on Bank Loans* (Bank of Japan)
Public services 1 (PS1)	Public safety expenditures (% of annual spending)	*Annual Report on Account Settlement by Prefecture* (Ministry of Internal Affairs and Communications) *Annual Report on Account Settlement by Municipality* (Ministry of Internal Affairs and Communications) *Annual Statistics on Local Public Finance* (Ministry of Internal Affairs and Communications)
Public services 2 (PS2)	Highway infrastructure (real highway length)	*Annual Report on Highway Statistics* (Ministry of Land, Infrastructure, Transport and Tourism)
Public services 3 (PS3)	Education expenditures (% of annual spending) –	*Annual Report on Account Settlement by Prefecture* (Ministry of Internal Affairs and Communications) *Annual Report on Account Settlement by Municipality* (Ministry of Internal Affairs and Communications) *Annual Statistics on Local Public Finance* (Ministry of Internal Affairs and Communications)

Source Prepared by the author

(2) Summary statistics and correlation matrices

Summary statistics and correlation matrices (after log-transformed) for the study variables are presented in Tables 2.6, 2.7, 2.8, and 2.9. The sample size was 188 (47 prefectures × 4 years) for all but two independent variables: real wages (RW) had a sample size of 180 due to missing data, while the METR (TAX) had a sample size of 187 because the rate was negative in one year of one prefecture and therefore could not be log-transformed. Coefficients presented in all correlation matrices were based on the log-transformed values for each variable.

Table 2.6 Summary statistics

	Sample size	Mean	S.D	Min	Max
WORKER (×10,000 people)	188	22.16	207,200	2.70	101.70
RW (×10,000 yen)	188	272.2	34.09	191.40	371.90
LP (yen/m^2)	180	17,752	16,359	843	93,742
EA	188	0.479	0.789	0.023	4.382
IA	188	0.027	0.053	0.001	0.315
MC (×10,000 people)	188	271.1	262.4	56.61	1374.0
TAX	187	0.990	0.204	−1.651	1.211
PS1 (%)	188	4.540	0.89	2.33	8.80
PS2 (km)	188	161.6	108.1	17.80	725.4
PS3 (%)	188	16.23	1.894	9.885	21.35

Note Numbers in parentheses indicate units
Source Prepared by the author

Table 2.7 Correlation matrix (nationwide)

	Worker	RW	LP	EA	IA	MC	TAX	PS1	PS2	PS3
Worker	1.000	0.722	0.539	0.560	0.717	0.891	−0.041	0.564	0.285	0.332
RW		1.000	0.540	0.489	0.746	0.608	−0.029	0.713	−0.047	0.425
LP			1.000	0.438	0.576	0.520	0.057	0.396	−0.089	0.288
EA				1.000	0.718	0.708	0.006	0.575	−0.199	−0.021
IA					1.000	0.675	−0.033	0.685	−0.274	0.375
MC						1.000	−0.007	0.591	0.175	0.243
TAX							1.000	−0.009	0.014	−0.033
PS1								1.000	−0.203	0.544
PS2									1.000	−0.060
PS3										1.000

Source Prepared by the author

2.5 Estimation Results

The estimation results of the proposed model are presented in Tables 2.10, 2.11, and 2.12. At the national level, the effect of the METR (TAX) on manufacturing sector employment (WORKER) was significantly negative in nearly all models tested.

The exception was Model 5, which included all independent variables, where it lost statistical significance. The correlation matrix for the national-level analysis (Table 2.7), however, suggested high collinearity between MC (market characteristics) and economic/industrial agglomeration (EA/IA). When EA and IA were removed, the negative effect of TAX regained statistical significance, as seen under Model 6.

Table 2.8 Correlation matrix (metropolitan)

	Worker	RW	LP	EA	IA	MC	TAX	PS1	PS2	PS3
Worker	1.000	0.576	0.520	0.636	0.804	0.927	0.066	0.496	0.393	0.098
RW		1.000	0.557	0.703	0.670	0.650	−0,047	0.620	−0.205	−0.250
LP			1.000	0.551	0.629	0.557	0.104	0.413	−0.141	−0.181
EA				1.000	0.918	0.794	0.080	0.690	−0.197	−0.460
IA					1.000	0.871	0.096	0.669	−0.058	−0.252
MC						1.000	0.128	0.654	0.182	−0.074
TAX							1.000	0.042	−0.080	−0.055
PS1								1.000	−0.200	−0.091
PS2									1.000	0.264
PS3										1.000

Source Prepared by the author

Table 2.9 Correlation matrix (provincial)

	Worker	RW	LP	EA	IA	MC	TAX	PS1	PS2	PS3
Worker	1.000	0.568	0.305	0.124	0.394	0.782	−0.026	0.223	0.622	0.202
RW		1.000	0.304	−0.167	0.581	0.281	0.181	0.507	0.265	0.423
LP			1.000	−0.005	0.300	0.238	0.232	0.053	0.098	0.201
EA				1.000	−0.125	0.433	−0.038	0.016	0.149	−0.096
IA					1.000	0.140	−0.053	0.364	−0.240	0.474
MC						1.000	−0.030	0.161	0.570	0.116
TAX							1.000	0.151	0.104	0.077
PS1								1.000	−0.002	0.663
PS2									1.000	−0.079
PS3										1.000

Source Prepared by the author

In contrast to TAX, market characteristics consistently had a significantly positive effect on manufacturing employment in every model in which it was included, and it reflected much larger elasticity in absolute terms (MC: 0.725 v. TAX: −0.014; Model 6).

In the case of Japan's three major metropolitan areas, same as in the national model, MC was highly inter-correlated with EA and IA (Table 2.8). When EA and IA were excluded, the impact of TAX was negative but not statistically significant (Model 12). The effects of MC and PS2 (real extension of expressway) were positive and statistically significant.

In the rest of Japan's prefectures ("provincial regions"), no such correlations with MC were visible for EA or IA (Table 2.9), so all nine independent variables were included in the final model (Model 17). Similar to that of metropolitan regions, the

Table 2.10 Effects of corporate tax environment on manufacturing employment (nationwide)

Dependent variable: WORKER						
Independent variable	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
TAX	−0.022*** (0.008)	−0.023*** (0.007)	−0.018** (0.007)	−0.011* (0.006)	−0.009 (0.007)	−0.014* (0.007)
RW		−0.027 (0.098)	−0.028 (0.097)	0.054 (0.079)	0.044 (0.078)	0.081 (0.071)
LP		0.002 (0.006)	0.002 (0.006)	−0.0002 (0.004)	−0.001 (0.005)	−0.001 (0.004)
EA			−0.008 (0.024)	−0.031 (0.022)	−0.037* (0.022)	
IA			0.088 (0.077)	0.086 (0.062)	0.088 (0.057)	
MC				0.797*** (0.204)	0.740*** (0.187)	0.725*** (0.208)
PS1					-0.115 (0.072)	−0.095 (0.073)
PS2					−0.005 (0.043)	−0.0008 (0.044)
PS3					0.110 (0.073)	0.102 (0.076)
Observations	187	180	180	180	180	180
Within R-squared	0.878	0.880	0.883	0.913	0.916	0.911
Time effects	Yes	Yes	Yes	Yes	Yes	Yes

Note (1) Clustered robust standard errors are given in parentheses under coefficients
(2) The individual coefficients are statistically significant at the *10%, **5%, and ***1% significance level
Source Prepared by the author

effect of TAX was negative but non-significant, while that of MC was positive and significant. In addition, the effect of real highway length (PS2) on industrial location was statistically significant, but opposite to the direction expected.

In summary, the findings above indicated that the METR had a significant negative effect on industrial location decisions at the national level, but lacked statistical significance when confined to only metropolitan or provincial regions within Japan. This discrepancy could be a consequence of the larger variation in the METR across all of Japan's prefectures (coefficient of variation: 55.975) than in either regional category (metropolitan: 11.333, provincial: 5.754). Therefore, it seems plausible that tax differences between Japan's three metropolitan areas and provincial regions did not significantly influence employment within either regional category.

Table 2.11 Effects of corporate tax environment on manufacturing employment (metropolitan)

Dependent variable: WORKER						
Independent variable	(7) FE	(8) FE	(9) FE	(10) FE	(11) FE	(12) FE
TAX	−0.029** (0.012)	−0.022* (0.011)	−0.003 (0.011)	−0.008 (0.010)	−0.004 (0.007)	−0.016 (0.010)
RW		0.294 (0.198)	0.452 (0.258)	0.410 (0.230)	0.229* (0.120)	0.091 (0.116)
LP		0.004 (0.014)	0.012 (0.014)	0.007 (0.016)	0.004 (0.016)	−0.001 (0.015)
EA			0.013 (0.049)	−0.007 (0.035)	0.076* (0.038)	
IA			0.416* (0.228)	0.432* (0.236)	0.147 (0.187)	
MC				0.294 (0.310)	0.624** (0.227)	0.798*** (0.234)
PS1					0.096 (0.069)	0.051 (0.117)
PS2					0.126** (0.057)	0.135*** (0.041)
PS3					0.445** (0.200)	0.306 (0.203)
Observations	52	49	49	49	49	49
Within R-squared	0.914	0.928	0.940	0.942	0.964	0.956
Time effects	Yes	Yes	Yes	Yes	Yes	Yes

Note (1) Clustered robust standard errors are given in parentheses under coefficients
(2) The individual coefficients are statistically significant at the *10%, **5%, and ***1% significance level
Source Prepared by the author

2.6 Conclusion

Japan's Business Location Promotion Law was enacted with the aim of revitalizing regional economies through decentralized industrial growth. This paper analyzed the effect of corporate tax policy—modeling tax burden as the METR at the prefectural level—on regional economic development by estimating its impact on firms' decisions about where to locate new facilities. The estimation models developed in the pages above revealed the following about these business trends in the last two decades:

(1) The effect of corporate taxation on regional economic development—modeled as employment in the manufacturing sector—is significantly negative at the

Table 2.12 Effects of corporate tax environment on manufacturing employment (provincial)

Dependent variable: WORKER					
Independent variable	(13) FE	(14) FE	(15) FE	(16) FE	(17) FE
TAX	−0.001 (0.366)	0.050 (0.348)	0.122 (0.300)	−0.172 (0.190)	−0.131 (0.180)
RW		−0.199 (0.135)	−0.187 (0.121)	−0.021 (0.087)	−0.026 (0.085)
LP		0.001 (0.007)	0.0009 (0.007)	0.0001 (0.004)	0.002 (0.005)
EA			−0.018 (0.035)	0.001 (0.021)	−0.002 (0.021)
IA			0.077 (0.072)	0.031 (0.044)	0.030 (0.035)
MC				1.266*** (0.176)	1.191*** (0.160)
PS1					−0.095 (0.060)
PS2					−0.083* (0.045)
PS3					0.061 (0.066)
Observations	135	131	131	131	131
Within R-squared	0.866	0.871	0.874	0.935	0.944
Time effects	Yes	Yes	Yes	Yes	Yes

Note (1) Clustered robust standard errors are given in parentheses under coefficients
(2) The individual coefficients are statistically significant at the *10%, **5%, and ***1% significance level
Source Prepared by the author

national level. However, when the country is split into two categories—Japan's three major metropolitan areas versus all other prefectures ("provincial regions")—the effect is not statistically significant in either category. This curious result may be explained by the smaller variation in the METR across prefectures within metropolitan regions and within provincial regions, compared with that of all prefectures in the country.

(2) Several independent variables unrelated to tax burden also influence regional economic development. Notably, market characteristics—modeled as population size—has a significantly positive effect both at the national level and separately within each regional category. The nationwide model indicated that the effect of market characteristics is considerably larger than that of corporate taxation.

(3) The public service of highway infrastructure (i.e., the real National Expressway length within a prefecture) has a significantly positive impact on manufacturing employment within Japan's three major metropolitan areas.

The results of the nationwide model reinforce those of previous studies reporting the differences in state and local tax burden to have negative, statistically significant, yet ultimately negligible effects on regional economic development. Several issues deserve future examination. First, since manufacturing is a highly diverse sector of the economy, it would be worthwhile to repeat the analysis separately for different industrial subsectors within it. Second, this study's focus on tax differences between different regions (prefectures) means that it did not cover how such differences may influence location decisions within a specific region, such as choosing from among municipalities within Japan's three major metropolitan areas.

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