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**Does Hometown Tax Donation System as Interjurisdictional  
Competition Affect Local Government Efficiency? Evidence from  
Japanese Municipality level Data**

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**Abstract**

This study analyzes the impact of Hometown Tax Donation (HTD), a unique local fiscal system in Japan, on local government efficiency. It allows residents to make donations to local governments of their choice, receiving deductions on payment of local and national taxes, equivalent to the amount donated, except for small self-paid amounts

(JPY2,000, US\$15). Moreover, donors can receive gifts from the recipient government in return, depending on the amount donated. Therefore, tax revenue will outflow from the donor residents' municipalities to other regions, whereas it will inflow to recipient municipalities from other regions. This makes local governments compete to receive donations under the HTD system by trying to enhance their efficiency. On the other hand, HTD may cause misperception of tax prices, thereby leading to inefficient provision of local public services. This study uses stochastic frontier analysis to quantitatively analyze the impact of HTD on the inefficiency of local governments. The findings reveal that municipalities whose revenues are more dependent on HTD tend to be more inefficient. Moreover, greater dependence on intergovernmental grants and local corporate taxation results in inefficiency, thus, providing implications for local public finance on the importance of decentralization. The results also highlight that competition for income through HTD is a zero-sum game, therefore, more fiscal autonomy is needed to ensure healthy competition, thereby, providing new evidence on the relationship between interjurisdictional competition and local government efficiency.

Keywords; Hometown Tax Donation (HTD), Local public finance, Local government's efficiency, Stochastic frontier analysis (SFA), Intergovernmental competition

JEL Classification H27; H71

## 1. Introduction

Local public sector efficiency is one of the most important issues in public economics (Aiello and Bonanno 2019), especially in term of cost because efficient provision of local public services may require less tax burden or transfer from upper-tier governments, resulting in economic growth, thereby, enhancing citizens' satisfaction. Therefore, many scholars have attempted to measure and analyze local governments' efficiency.

The motivation behind empirical studies related to local government efficiency is threefold. The first is to clarify how to measure (in)efficiency of local governments by using alternative empirical methods (De Borger and Kerstens 1996; Worthington 2000), thereby, focusing mainly on the technical aspects and attempting to clarify which method is superior. For example, De Borger and Kerstens (1996) calculated the cost efficiency indices of Belgian local governments for five different technologies, including two non-parametric (Free Disposal Hull; FDH and Data Envelop Analysis; DEA) and three parametric methods (deterministic and stochastic frontiers). The second is to discover the sources of (in)efficiency of local governments. Here, the possible candidates are political or budgetary institutions (Borge et al. 2008; Geys et al. 2010; Ashworth et al. 2014), intergovernmental grants (Geys and Mosen 2009; Kalb 2010), the degree of decentralization (Balaguer-Coll et al. 2010; Boetti et al. 2012), municipality amalgamation (Nakazawa 2013), existence of abundant natural resources (Borge et al. 2015; Ayala-García and Dall' erba 2021), introduction of accrual accounting (Lampe et al. 2015), and so on. Although the majority of studies pertaining to the literature have clarified some important sources of (in)efficiency, more dependence on intergovernmental grants or less political competition tends to lower

efficiency. However, there are other possible factors affecting (in) efficiency of local governments. The third is to determine spatial interdependence. These studies generally show the spatial effects of local government efficiency, implying yardstick competition between local governments (Geys 2006; Santolini 2018; Balaguer–Coll et al. 2019).

This study investigates whether the Hometown Tax Donation (HTD) system in Japan affects the efficiency of local governments. The Japanese HTD is a unique donation system started in 2007, under which taxpayers can donate to any local government (including municipalities and prefectures) with a small amount of individual payment (JPY2,000, US\$15) and receive very generous deductions depending on their taxable income. Donors generally receive gifts from the recipient government in return, depending on the donation amount. The purpose of the HTD system<sup>1</sup> is that many people who are born in rural Japan move to metropolitan areas when entering universities or starting jobs, and though they enjoy the local public services provided by their hometown while growing up, when they start earning, they pay most of their taxes to the municipality where they are living, in a metropolitan area. Thus, HTD is a tool that enables residents in metropolitan areas to donate to their hometowns, with a sense of giving back to the place from where they received. As a desirable effect of the HTD system, it was expected that interjurisdictional competition seeking donations would result in a more transparent and efficient government. Actually, it can contribute to efficiency, based on the predictions of the fiscal federalism literature (Boetti et al.

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<sup>1</sup> See ‘Philosophy of Hometown Tax Donation’ on the webpage of Ministry of Internal Affairs and Communication (in Japanese).  
URL, Retrieved from  
[https://www.soumu.go.jp/main\\_sosiki/jichi\\_zeisei/czaisei/czaisei\\_seido/furusato/policy/](https://www.soumu.go.jp/main_sosiki/jichi_zeisei/czaisei/czaisei_seido/furusato/policy/)

2012). However, there is an important objection to this argument. Based on the literature on the relationship between intergovernmental grants and local government efficiency, it is hypothesized that dependence on intergovernmental grants from other governments or corporate taxation causes local taxpayers to miscalculate their tax prices, leading to wasteful expenditures or inefficiency (Akai et al. 2003; Eom and Rubenstein 2006; Kalb, 2010)<sup>2</sup>. As donations from citizens living in other jurisdictions under the HTD system are financial resources that are not borne by residents, the same logic may apply. Therefore, a greater dependence on donations under the HTD system may result in inefficiency.

This study contributes to the existing literature in the following ways. First, only a few studies have attempted to analyze the effects of the HTD system, which is unique and recently introduced in Japan, enabling us to discover whether this new policy experiment in Japan is beneficial or harmful to the performance of the local public sector<sup>3</sup>. Second, this study provides new evidence to add to the literature on local government efficiency, because we not only consider dependence on HTD but also other possible sources of (in) efficiency, including dependence on intergovernmental grants or local corporate taxation, in a panel data setting. Third, our results provide

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<sup>2</sup> As theoretical arguments explain this phenomenon, some alternative models can be considered. Kalb (2010) assumes that the citizens of the local jurisdictions are susceptible to a misperception of the true tax price of local public service provision due to fiscal illusion. De Borger and Kerstens (1996) point out the possibility that flypaper effect contributes to inefficiency, and Akai et al. (2003) discuss that intergovernmental grants bring about soft budget problem.

<sup>3</sup> Fukazawa (2021) is one of the few exemptions, which investigates the relationship between HTD and local government efficiency using cross-section analysis. Although it has important results, unobserved heterogeneity between municipalities or year specific effects are not considered because of only one-year cross section data setting. Fukazawa et al. (2020) clarifies competition for donations induced by HTD system reduce net revenue of municipalities seeking the donation. Kato and Yanagihara (2021) developed a two-region model to investigate theoretically how tax deductions under the HTD system affects local tax revenue.

insights into important debates in the two dimensions of intergovernmental relationships. One is a vertical relationship, which relates to whether decentralization or centralization is better (Oates 1972; Costa-Font et al. 2015), and the other is a horizontal relationship, relating to whether interjurisdictional competition is good or not (Tiebout 1956; Hatfield and Kosec 2013).

The remainder of this paper is organized as follows. In section 2, under “Theoretical Framework/ background, and hypotheses development”, we introduce the HTD system in Japan, provide an overview of the local government’s finance system, and develop the hypotheses. Section 3 describes the analysis methodology and data. After presenting the results of the analysis in section 4, we discuss them and conclude with policy recommendations, as well as a vision for future research in section 5.

## **2. Theoretical Framework/Background and Hypotheses Development**

### **2.1 *Hometown Tax Donation System in Japan***

In Japan, according to the local tax law, inhabitant taxes are paid to the prefecture and municipality in which one resides. On the other hand, there currently exist a system called the “Hometown Tax Donation System (*Furusato Nouzei* in Japanese)” which was introduced in 2007. A report published by the Ministry of Internal Affairs and Communications states that the significance of HTD is that (1) tax awareness is enhanced because people can choose where to donate their money, (2) donors can contribute to their hometown, the region where they were born, and want to support, and (3) competition among local governments increased, requiring them to consider how the region should be and what should be chosen as a donation destination. The

report also states that “in order for a local government to receive donations from taxpayers, it is a prerequisite that it conducts its administration in a manner that is appropriate for receiving donations” and that “tireless management efforts are required toward desirable local politics and administration.” Policymakers hoped that HTD would lead to good competition among local governments.

Under this system, when taxpayers donate to any local government<sup>4</sup>, they receive a deduction on their taxable income under their local inhabitant and national income tax policy, proportionate to the amount donated, making it a unique local fiscal system, even from an international perspective. The total amount of local taxes in FY 2018 was 39.4 trillion yen, with HTD donations amounting to approximately 1% of the local tax revenues of all municipalities. The financial impact of the HTD amount received by each municipality was not small. On average, HTD revenue accounts for approximately 12% of local tax revenues, with some municipalities receiving more than 200% (FY 2019). In addition, the financial impact of the HTD was relatively larger for municipalities with smaller populations (Fig.1)<sup>5</sup>.

For example, a resident of municipality A donates 100,000 yen to municipality B and is therefore entitled to a deduction of JPY 98, 000 on the inhabitant and income tax payable to Municipality A and the government, respectively. Note that 2,000 yen (US\$1.5) is the self-payment required to receive a tax deduction through the HTD system. However, in practice, this mechanism differs from the horizontal fiscal

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<sup>4</sup> Donors do not necessarily have to choose a real Hometown such as place of birth, and can donate to more than one municipality.

<sup>5</sup> The dependence on HTD is defined as the ratio of HTD revenues to the standard financial scale, which is the sum of local tax revenues and fiscal transfers from the national government that are not predetermined for use. It can be regarded as the sum of general financial resources.



transfers between municipalities A and B. This is because municipalities that lose local tax revenue due to HTD are compensated for 75% of their loss by the national government through an intergovernmental grant. Therefore, in the previous case, where a resident of Municipality A donates 100,000 yen to Municipality B, Municipality A loses 78,400 yen of inhabitant tax revenue, and the national government loses 19,600 yen of income tax revenue. However, 58,800 yen (75% of 78,400 yen) of the inhabitant tax revenue lost by Municipality A will be compensated for by the national government through an intergovernmental grant<sup>6</sup>.

The amount of donations through HTD has increased 50-fold since 2007, when the program was launched (Fig 2), due to local governments sending gifts back to donors. As in the previous example, let us assume that a donor of Municipality A donates 100,000 yen to Municipality B. Under HTD, Municipality A is allowed to send gifts of up to 50% of the amount donated to donors<sup>7</sup>. Therefore, the donor not only receives a tax deduction for the donated amount but also enjoys an economic benefit equivalent to 50% of it, which is 50,000 yen. Some municipalities even offer high cash value gifts to donors, such as precious metals and gift certificates. This has led to some suggestions that HTD distorts Japan's donation culture (Sato 2017). Several studies in Japan have empirically demonstrated this as being the reason behind donors' motivation (Nishimura et al. 2017; Yamamura et al. 2021).

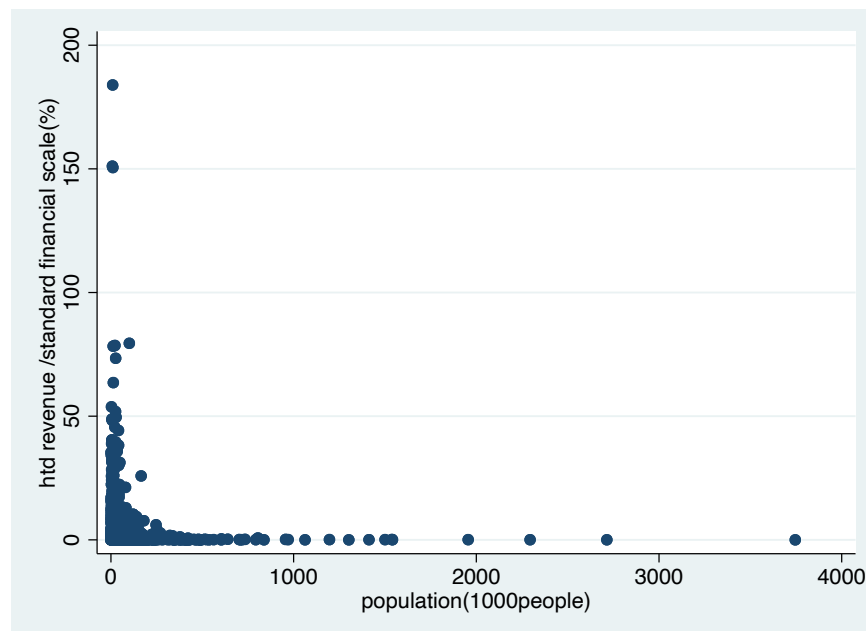
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<sup>6</sup> The amount of the tax deduction is capped and depends on the donor's income and family structure. The higher the donor's income, the higher the deduction. This is another problem of HTD system.

<sup>7</sup> In 2019, the Ministry of Internal Affairs and Communications amended the Local Tax Law to limit the combined cost of procuring and sending return gifts to not more than 50% of the donation amount. Until the local tax law was amended, some municipalities sent gifts with a monetary value exceeding 60% to donors. In addition, after 2019, gifts are required to be locally produced, so the most popular gifts are agricultural and marine products. Typical examples are rice, wagyu beef, and scallops.

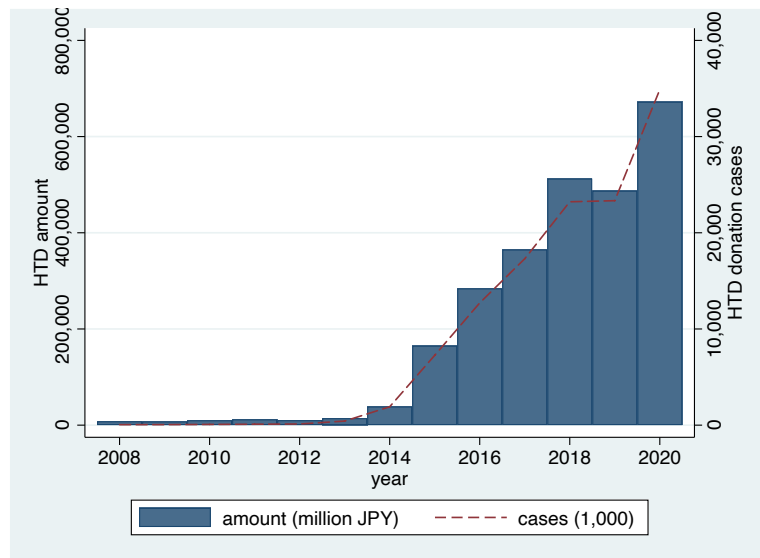
In addition, there is an upper limit to the amount of deduction, however, high-earners can obtain higher deductions than low-earners. Some studies point out that this has led to regressive taxation (Sato 2017; Hashimoto 2019). Moreover, Japan's finances are extremely tight and most of the national budget is financed by issuing government bonds. Therefore, donations through HTD can be thought of as shifting the burden to future generations (Bessho 2017).

**Fig.1** The dependence on HTD ratio vs population (FY 2019)



Source: Survey of the Ministry of Internal Affairs and Communication

**Fig.2** Amount and number of HTD donations



Source: Survey of the Ministry of Internal Affairs and Communication

## ***2.2 Institutional Background***

Japan is a unitary state consisting of three levels of government: national, prefectural, and municipal. The expenditure by the national and local governments in FY 2020 was 222.5 trillion yen, of which 44% and 56 % was spent by the national government and local governments, respectively. Meanwhile, the ratio of national and local taxes, which is the main sources of expenditure by national and local governments, is 61.4% and 38.6%, respectively. Among the local taxes, municipal and prefectural taxes account for 21.2% and 17.4%, respectively. Individual and corporate inhabitant taxes account for 37.5% and 8.1% of municipal taxes, respectively, whereas property taxes account for 41.8%.

There are large differences in local tax revenues by region, and when examined by prefecture, local tax revenue in Tokyo, the capital city, is 1.5 times the national average. Intergovernmental fiscal transfers from the national to local governments

finances the gap between local tax revenue and government expenditure. The main fiscal transfer system is called the Local Allocation Tax Grants (LAT), and its total amount is planned by the national Ministry of Finance, while the national Ministry of Internal Affairs and Communications is in charge of allocation. The amount allocated to each municipality is determined by the difference between the expenditure and revenue, based on certain criteria, which also corrects the gap in local tax revenue to a certain extent. In addition, the existence of an intergovernmental fiscal transfer system called National Government Disbursement, in which transfers are made by national ministries and agencies, is also an important source for local governments to execute their policies. Among local government revenues, local taxes, LAT grants, and national government disbursement account for 40.8, 16.7 and 37.4 trillion-yen, respectively.

### ***2.3 Setting and Hypotheses***

While analyzing, many studies have found intergovernmental grants to be a source of inefficiency (Geys and Mosen 2009; Kalb 2010), in particular, grants from other governments and corporate taxes that mislead taxpayers regarding tax prices, leading to inefficiency in local governments (Akai et al. 2003; Eom and Rubenstein 2006; Kalb 2010), implying that HTD may lead to such inefficiency. The logic being that if revenues from HTD are viewed as being borne by other regions, as in the case of corporate tax revenues, residents of recipient regions will consider the tax price to be discounted, thereby reducing their incentive to monitor their region's fiscal management.

However, some studies have shown that interjurisdictional competition may contribute to efficiency (Boetti et al. 2012). Previous studies have shown that

competition among local governments increases efficiency, as in the case of HTD, although it depends on whether it can lead to healthy competition for donations, as policymakers intended. Thus, there is a possibility of the relationship between HTD and local government being either efficient or inefficient, which this study analyzes. Since HTD is a unique system, few studies have analyzed the impact of this system on the efficiency of local governments, with this point not being clearly determined.

### 3. Estimation Approach and Data

To analyze the cost efficiency of municipalities, we use the stochastic parametric approach by Aigner et al. (1977) and Meeusen and van den Broeck (1977), which uses the deviation of the cost or product function from the efficient frontier as an indicator of the inefficiency of the decision-maker. The Cobb-Douglas functional form used is described below:

$$\ln C_{it} = \beta_0 + \sum_{r=1}^s \beta_r \ln y_{r,it} + v_{it} + u_{it} + \eta_t \quad (1)$$

where  $C$  is the dependent variable representing the cost (input),  $y$  represents a variable representing the output of the decision-maker,  $\eta$  is year specific dummy,  $\beta$  is the parameter to be estimated,  $i$  represents the decision-maker, and  $t$  represents the year. The decision-making entity in this study is the local government, and  $y$  is the output supplied by them; however, the output and factor prices of production supplied by them cannot be directly observed. The error term in the stochastic frontier models is assumed to consist of two independent components ( $v$  and  $u$ ), where  $v$  is the usual stochastic error term, and  $u$  is a random variable representing cost inefficiency ( $u > 0$ ). In addition, we use the model by Battese and Coeli (1995), in which

the determinants of inefficiency are estimated simultaneously along with the stochastic frontier cost function. The inefficiency term  $u$  in this model is assumed to be a variable over time, and is expressed as

$$u_{it} = \sum_{j=1}^J \delta_j z_{j,it} + w_{it} \quad (2)$$

where  $z$  is a factor variable for inefficiency. The normal stochastic error term  $v$  follows a normal distribution  $N(0, \sigma_v^2)$  and the cost-effectiveness random variable  $u$  follows a truncated normal distribution  $N(z_i \delta, \sigma_u^2)$  which is truncated at 0.  $\delta$  and is the parameter to be estimated. Additionally,  $w$  follows a truncated normal distribution  $N(0, \sigma_w^2)$ , truncated at  $-z_i \delta$ .

Though as of September 2022, there were 1718 municipalities in Japan, we excluded the following municipalities from our sample: those in Iwate, Miyagi, and Fukushima prefectures that were heavily affected by the 2011 Great East Japan Earthquake (122); those merged during the analysis period (54); those in government-designated cities, having greater authority than the standard municipality (20); and the one in Yubari City (1), as the city financially collapsed in 2006. Thus, our sample finally consisted of 1369 municipalities. The data analysis period was from 2010 to 2019. As it is difficult to define the output of a local government (De Borger et al. 1994), we used the following six variables based on previous studies (Vanden Eeckhaut et al. 1993; De Borger et al. 1994; De Borger and Kerstens 1996; Geys and Moesen 2009a; Geys and Moesen 2009b; Geys et al. 2010; Lampe et al. 2015).

STU: Students in primary and secondary school

INF: Infants in kindergarten and nursery

REC: Number of recreational facilities (number of public halls, civic halls, museums, libraries, sports facilities, and meeting places)

POP: Total population

OLD: Population older than 65 years

EMP: Number of employees

These variables are commonly used in administrative efficiency studies (De Borger et al. 1994; De Borger and Kerstens 1996; Kalb 2009; Lampe et al. 2015) The total population (POP) reflects the demand for public services in a municipality. The number of primary and secondary school students (STU) and the number of kindergarten and nursery students (INF) represent the demand for services by young people, while the population over 65 years of age (OLD) represents the demand for nursing homes and services for the elderly. Additionally, the number of employees (EMP) is a proxy variable for those paying social security contributions, representing the demand for infrastructure for business development. The number of recreational facilities (REC) represents the demand for recreational services. As mentioned earlier, these are not direct outputs, as these outputs and production factor prices cannot be directly observed. Additionally, the quality of services has also not been considered. However, by selecting output indicators based on previous studies, we can compare our findings with those from them. Additionally, the following variables were employed to affect the level of inefficiency: First, the population density (DEN), which represents the fiscal disparity between urban and rural areas (Geys et al., 2010; Kalb, 2009), was added to control for the characteristics of each municipality. Second, to determine whether HTD inhibits cost minimization incentives, we added the HTD dependency ratio (HTD

revenue/standard financial scale<sup>8</sup>: HTD) as a variable. Moreover, considering that LAT grants and corporate taxation inhibit cost minimization incentives, as identified by Akai et al. (2003), we also included the LAT (local allocation tax grant revenue/standard financial scale: LAT) and corporate taxation dependency ratio (corporate inhabitant tax revenue/local tax revenue: CTAX), respectively. To account for simultaneity bias<sup>9</sup>, we used these variables from one period earlier. Finally, the time trend (years) was added to control for time effects in the stochastic frontier and inefficiency models.

We analyzed this model with two definitions based on the cost of local governments: the first is total (TEXP) and the second is current expenditure (CEXP), respectively, which excludes real investments and debt repayments. The descriptive statistics for all the variables are summarized in Table 1.

The model used for estimation is as follows.

$$\ln EXP_{it} = \beta_0 + \beta_1 STU_{it} + \beta_2 INF_{it} + \beta_3 REC_{it} + \beta_4 POP_{it} + \beta_5 OLD_{it} + \beta_6 EMP_{it} + v_{it} + u_{it} + \eta_t \quad (3)$$

$$u_{it} = \delta_1 DEN_{it} + \delta_2 HTD_{it-1} + \delta_3 LAT_{it-1} + \delta_4 CTAX_{it-1} + w_{it} \quad (4)$$

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<sup>8</sup> The tax revenue that a local government can obtain plus the grant from the national government. It is considered to be the sum of general revenue.

<sup>9</sup> We have to measure the impact of these indicators on cost efficiency, but they may be affected by costs increased by simultaneous inefficiencies.



**Table 1** Descriptive statistics (1369 municipalities over 11 years)

Variable	Obs	Mean	Std. Dev.	Min	Max	Year
<i>Input variable</i>						
Net current expenditure (TEXP)*1	13690	23800000	30100000	1278267	260000000	2010-19
Net current expenditure minus	13690	14500000	19400000	645933	163000000	2010-19
<i>Output variable</i>						
Students in primary school and junior high school (STU)*1	13690	4665.333	6980.542	37	52520	2010-19
Infants in kindergarten*2 and nursery*1 (INF)	13690	1771.776	2564.532	6	21456	2010-19
Number of recreational facilities (REC)*1	13690	103.7947	106.4137	1	799	2010-19
Total population (POP)*1	13690	57926.9	84263.17	701	649598	2010-19
Population older than 65 years (OLD)*1	13690	15101.95	20367.04	255	159371	2010-19
Number of employees (EMP)*1	13690	26731.45	38462.16	328	291500	2010-19
Population density (DEN)*1	13690	947.2319	1856.524	2.558542	14757.06	2010-19
HTD donation revenue*1	13690	86507.56	638254.3	0	49800000	2009-18
Corporate inhabitant tax*1	13690	650117.7	1327136	1971	37000000	2009-18
Local allocation tax revenue*1	13690	4083267	4181324	0	40100000	2009-18
Local tax revenue*1	13690	8186849	13500000	50018	122000000	2009-18
Standard financial scale*1	13690	13800000	16900000	630800	149000000	2009-18

Notes: (EMP) Due to data limitations, linear completion was performed using data from 2005, 2010, 2015, and 2020.

Source:

\*1: Survey of the Ministry of Internal Affairs and Communication

\*2: Survey of the Ministry of Health, Labor, and Welfare

#### 4. Estimation Results

The parameters of the stochastic frontier function (Equation 3) and the inefficiency model (Equation 4) have been estimated simultaneously using the maximum likelihood estimation method with the R package 'frontier' (Coelli and Henningsen 2013). Models 1 and 2 have been estimated using total expenditure (TEXP) as input and current expenditure (CEXP), respectively. Table 2 summarizes the baseline estimation results. Gamma is significant in both the models, and their relatively high values indicate that most of the variation in the composite error term is due to the inefficiency component ( $u_i$ ), in contrast to the error term ( $v_i$ ). Column (1.1) shows strong support for the hypothesis. Note that HTD is also positively significant in the estimation results (Column 1.2). Although in Column (1.1), the coefficient of HTD is smaller than that of LAT and CTAX, which were cited as factors of inefficiency in previous studies, the results strongly suggest that cost inefficiency increases for municipalities with high HTD dependency ratios. In Model 2, the HTD variable is also positively significant.

Next, focusing on LAT and CTAX, we find that they are significant in these models, having a significant positive impact on the inefficiency of each municipality. Therefore, it can be said that intergovernmental grants and other tax sources not directly borne by residents lead to inefficiency. DEN, which was added as a control variable, has a significantly positive impact on municipal efficiency. Therefore, it is possible that regions with a higher population density have a cost advantage due to economies of scale<sup>10</sup>. This result is consistent with those of previous studies (Kalb 2009; Geys et al. 2010).

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<sup>10</sup> It has been found that municipalities with high HTD dependence tend to be located in rural areas with low population (Fig1).

As mentioned earlier, HTD may lead to healthy competition between municipalities; however, from the estimation results, it is clear that the ability of HTD to gain tax revenue from other regions as donations is a disincentive to cost minimization for local governments. Although, originally HTD may have been to encourage local governments to compete for better administrative management, this has not been the case. In other words, the more a municipality relies on tax revenues from other regions by HTD donations, the more residents feel that the tax burden is discounted, thereby, causing residents to lack the incentive to monitor, which ultimately is likely to create moral hazards.

We now review the estimation results to check for robustness (table 3). Both the estimates are based on total expenditure (TEXP), and Model 3 excludes municipalities with jurisdiction over remote islands from the sample<sup>11</sup> assuming that they would incur higher costs compared to those without such jurisdiction. Model 4 uses total expenditure, excluding the cost of gifts (including purchasing and sending costs)<sup>12</sup>. This is because municipalities sending more gifts to donors to receive many HTD donations may deviate from efficiency due to the gift costs. Thus, if these costs are excluded and the municipality still deviates from efficiency, the result that HTD leads to municipal inefficiency is more robust. The empirical results in table 3 again show that HTD is positively significant, and other main results remain unchanged, thus confirming the robustness of the results.

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<sup>11</sup> Specifically, 86 municipalities were excluded from the sample. These municipalities received a grant from the national government for having jurisdiction over remote islands because of their perceived additional cost of jurisdiction.

<sup>12</sup> The sample is much smaller because data on costs related to return gifts is available only from 2016.

**Table 2 Results of the multi-output frontier estimation (baseline)**

	Model 1 (TEXP)		Model 2 (CEXP)	
	(1.1)	(1.2)	(2.1)	(2.2)
Stochastic frontier model				
Constant	16.18081 *** (0.00621)	16.18307 *** (0.00628)	15.63900 *** (0.00681)	15.63900 *** (0.00677)
Students in primary and secondary school (STU)	0.02424 (0.02238)	0.02549 (0.02291)	-0.10182 *** (0.02226)	-0.10422 *** (0.02236)
Infants in kindergarten and nursery	0.18387 *** (0.01042)	0.18702 *** (0.01081)	0.12709 *** (0.01049)	0.13058 *** (0.01030)
Recreational facilities (REC)	0.05668 *** (0.00247)	0.05692 *** (0.00234)	0.05214 *** (0.00204)	0.05228 *** (0.00205)
Number of employees (EMP)	-0.11297 *** (0.02860)	-0.11273 *** (0.02848)	0.32628 *** (0.02845)	0.32178 *** (0.02922)
Total population (POP)	0.81172 *** (0.04955)	0.79802 *** (0.05076)	0.53114 *** (0.04837)	0.52954 *** (0.04963)
Population older than 65 (OLD)	0.19081 *** (0.01869)	0.19837 *** (0.01974)	0.21077 *** (0.01814)	0.21523 *** (0.01821)
Year dummy	yes	yes	yes	yes
Inefficiency model				
Constant	-0.07700 ** (0.03658)	-0.07115 * (0.03727)	-1.46820 *** (0.06145)	-1.51920 *** (0.06394)
HTD ratio (HTD)	0.22110 *** (0.02385)		0.22088 *** (0.02091)	
CTAX ratio (CTAX)	1.10519 *** (0.15305)	1.12810 *** (0.15308)	2.14160 *** (0.13621)	2.20330 *** (0.13818)
LAT ratio (LAT)	1.10066 *** (0.04479)	1.09516 *** (0.04579)	2.48060 *** (0.07386)	2.54300 *** (0.07731)
Population density (DEN)	-0.00245 *** (0.00010)	-0.00256 *** (0.00011)	0.00008 *** (0.00001)	0.00008 *** (0.00001)
sigmaSq	0.08632 *** (0.00224)	0.08787 *** (0.00223)	0.08317 *** (0.00361)	0.08645 *** (0.00371)
Gamma	0.75912 *** (0.00868)	0.76036 *** (0.00873)	0.81519 *** (0.01669)	0.82328 *** (0.01517)
Log likelihood value	2715.431	2675.558	3591.354	3551.164
Observations	13690	13690	13690	13690

Notes: N = 13690. Std. errors are shown in parentheses. Except for the variables in the inefficiency model, each variable is normalized by its sample mean and natural logs.

\*\*\* \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

**Table 3 Results of the multi-output frontier estimation (Robustness check)**

	Model 3 (TEXP_ISLAND)		Model 4 (TEXP_GIFT)	
	(3.1)	(3.2)	(4.1)	(4.2)
Stochastic frontier model				
Constant	16.17818 *** (0.00648)	16.18149 *** (0.00661)	16.19324 *** (0.00901)	16.19920 *** (0.00909)
Students in primary and secondary school (STU)	0.05327 ** (0.02286)	0.05586 ** (0.02299)	-0.03415 (0.03383)	-0.03054 (0.03345)
Infants in kindergarten and nursery (INF)	0.18542 *** (0.01076)	0.18924 *** (0.01085)	0.19495 *** (0.01697)	0.20147 *** (0.01696)
Recreational facilities (REC)	0.05519 *** (0.00226)	0.05545 *** (0.00230)	0.05440 *** (0.00371)	0.05462 *** (0.00355)
Number of employees (EMP)	-0.16622 *** (0.02940)	-0.16461 *** (0.02936)	-0.18840 *** (0.04768)	-0.18234 *** (0.04835)
Total population (POP)	0.85438 *** (0.05153)	0.83426 *** (0.05227)	1.05227 *** (0.08530)	1.01762 *** (0.08426)
Population older than 65 years (OLD)	0.16987 *** (0.01983)	0.18004 *** (0.02006)	0.08984 *** (0.03368)	0.10527 *** (0.03241)
Year dummy	yes	yes	yes	yes
Inefficiency model				
Constant	0.07978 ** (0.03446)	0.09325 *** (0.03490)	-0.19980 *** (0.05677)	-0.19151 *** (0.06084)
HTD ratio (HTD)	0.21385 *** 0.02203		0.16473 *** 0.02310	
CTAX ratio (CTAX)	1.06296 *** (0.15561)	1.08469 *** (0.12160)	1.48346 *** (0.22820)	1.50778 *** (0.25167)
LAT ratio (LAT)	0.88907 *** (0.04249)	0.87302 *** (0.04501)	1.26081 *** (0.06814)	1.25124 *** (0.07478)
Population density (DEN)	-0.00277 *** (0.00012)	-0.00291 *** (0.00012)	-0.00195 *** (0.00015)	-0.00209 *** (0.00016)
sigmaSq	0.08305 *** (0.00212)	0.08444 *** (0.00217)	0.08744 *** (0.00346)	0.08909 *** (0.00365)
gamma	0.74275 *** (0.00962)	0.74258 *** (0.00963)	0.76909 *** (0.01462)	0.76661 *** (0.01492)
Log likelihood value	2673.11	2634.482	978.7942	957.7946
Observations	12830	12830	5476	5476

Notes: N = 12830 (model 3), 5476 (model 4). Std. errors are shown in parentheses. Except for the variables in the inefficiency model, each variable is normalized by its sample mean and natural logs.

\*\*\* \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

## 5. Discussion and Conclusion

The purpose of this study is to determine how the efficiency of local governments is affected by revenues obtained from other governments, focusing on the unique Japanese system of HTD. Under the HTD system, residents donate to other local governments of their choice, and receive a deduction for a portion of the local and national taxes payable.

According to previous studies, grants from other governments and corporate taxes mislead taxpayers about tax costs, leading to local government inefficiencies. HTD donations may have the same effect as intergovernmental grants and corporate taxation, as they bring in tax revenue from other municipalities. The logic is as follows: If HTD revenues are viewed as being borne by other regions, residents of the recipient regions will consider the tax price to be discounted, thereby, reducing their incentive to monitor the fiscal management of their region. However, studies have also shown that interjurisdictional competition may contribute to greater efficiency, which means that the HTD system can lead to efficiency, exactly as policymakers envisioned when they planned the system. Thus, there is a possibility of the relationship between HTD and local government being either efficient or inefficient. Therefore, this study uses stochastic frontier analysis to clarify whether cost minimization incentives are inhibited by HTD donations. To the best of our knowledge, only a few studies have been conducted so far. Therefore, we aimed to answer whether HTD has increased local governments' efficiency or decreased it.

Our results show that local governments with high rates of dependence on HTD are less efficient in public service delivery. This is similarly seen for local governments with a high rate of dependence on LAT and CTAX. As implications for local public

finance, decentralization may be important, given that our results show that dependence on intergovernmental grants is related to low efficiency. Interjurisdictional competition induced by HTD does not contribute to local government efficiency, therefore, it does not lead to healthy competition among municipalities in terms of increasing efficiency, and in fact has the opposite effect, by misleading tax costs. Therefore, the question arises as to why does HTD not lead to healthy competition? This may be because of a lack of fiscal autonomy. In other words, in Japan, LAT grants guarantee the minimum financial resources necessary for local governments to provide a minimum level of public services to residents<sup>13</sup>, which is based on national standards. Despite this, HTD provides additional revenue, impeding the local government's cost minimization incentive. Furthermore, since HTD donations are inextricably linked to compensation from the national government to municipalities that have lost tax revenues due to HTD, residents of municipalities that receive HTD donations also bear the burden of national taxation<sup>14</sup>. Therefore, more fiscal autonomy is needed to ensure healthy competition by HTD, as intended by policymakers. It should also be mentioned that competition for income through HTD is a zero-sum game.

There are certain issues that this study has not touched upon and which provides scope for future research. First, it is possible that purchasing of gifts<sup>15</sup> by local governments with tax may help stimulate the local economy (Doi 2014), which makes it necessary to analyze how HTD affects the local economy. Second, it is imperative

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<sup>13</sup> However, since the determination of the total LAT grants amount and that distributed to each municipality are based on different criteria, there is an over/under compensation by the LAT grants when viewed on a municipality-by-municipality basis.

<sup>14</sup> Naturally, the LAT grants are financed by government taxes by issuing government bonds. Furthermore, Japan's national public finance has been strained in recent years. In light of this, it can be said that the HTD is postponing the burden to future generations.

<sup>15</sup> The Ministry of Internal Affairs and Communications has instructed that return gifts must be local products.

to estimate a cost function for each administrative area and measure its efficiency.

This would help determine the areas in which HTD has impaired efficiency.

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