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Economic Behavior of Local Governments and Hometown Tax Donation (Furusato Nozei) in Japan: Effects of Regulations in a Monopolistic Competition Model

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Economic Behavior of Local Governments and Hometown Tax Donation (*Furusato Nozei*) in Japan: Effects of Regulations in a Monopolistic Competition Model

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Abstract

The hometown tax donation system (*Furusato Nozei*), which has become an important topic in Japan's local government finances, is not financially sustainable and has led to excessive competition for reciprocal gifts. Behind this are local governments eager to obtain donations. This study presents a model of the economic behavior of local governments eager to obtain donations and analyzes the effects of the Ministry of Internal Affairs and Communications (MIC) regulations (the Appropriate Recruitment Rule and the Reciprocal gift Ratio Rule). Given that reciprocal gifts have brand power, the lower the donation price, the higher the number of donations. Assuming that local governments act like firms, this study employs a monopolistic competition model based on the household donation demand curve. It examines how the number of donations varies with changes in parameters, considering that the equilibrium number of donations that maximizes net donation revenue is greater than the number of donations under MIC regulations. The study uses data to investigate the policy effects of the introduction of MIC regulations. Local governments, ranked 1–200 in net donation revenue per capita is consistent with the economic behavior model, increased the expense ratios before the regulations and decreased the number of donations after the regulations. The donation revenue share of the top 100 local governments decreased from approximately 50% before the

[*] Professor, School of Economics, Kwansei Gakuin University, E-mail: uemuratoshi@hotmail.com. The author served as a committee member (acting chairman) of the Sumoto City Third-Party Investigation Committee for Hometown Tax Donation Issues at the request of Sumoto City, Hyogo Prefecture, designated the Hometown Tax Donation System in September 2022. The final report by Kawase, Uemura, Ieki, and Ikeda (2023) was submitted to Sumoto City in September 2023. The inspiration for this study reflects the author's experience in surveying Sumoto City that was eager to obtain donations going against the Ministry of Internal Affairs and Communications regulations.

MIC regulations to 30% after, indicating that these were effective in regulating the economic behavior of local governments eager to obtain donations. Not all around 1,700 local governments are enthusiastic about obtaining donations, but some local governments could be accelerating the competition for reciprocal gift.

JEL Classification: H71, H77
Keywords: Hometown tax donation system, Competition for reciprocal gift, Monopolistic competition model

1. Introduction

In Japan, the hometown tax donation system (*Furusato Nozei*) has played a significant role in financing local governments. Both donation revenue and the number of donations have increased since its inception in May 2008, as shown in Figure 1. Note that donation revenue reached 965.4 billion yen in FY2022.

Figure 1 around here

Figure 2 shows the percentage increase in donation revenue, recording double digits or higher in most years. However, while local tax revenue growth has been steady, the percentage increase has been small; in fact, many local governments in urban areas are threatened by local tax revenue outflows. The current hometown tax donation system may no longer be financially sustainable, owing mainly to the economic behavior of local governments eager to obtain donations, as reflected in their excessive competition over reciprocal gifts.

Figure 2 around here

This study clarifies the economic behavior of local governments eager to obtain donations for the hometown tax donation system and the potential policy effects of the Ministry of Internal Affairs and Communications (MIC) regulations imposed to control this excess.

Regarding the local governments' economic behavior toward the hometown tax donation system, several studies have conducted empirical analyses focusing on the relationship between the ratio of the procurement cost of reciprocal gifts to the amount of donations (hereafter, the reciprocal gift ratio).[1] For example, Yamamura et al. (2017) find that an increase in reciprocal gifts spending leads to an increase in the number of donations. Musha (2019) highlights that an increase in the reciprocal gift ratio results in an increase in donation revenue in the municipalities in Hokkaido. Ishimaru (2022) analyzes the relationship between the reciprocal gift ratio and donations using individual data from Sanda City, Hyogo Prefecture. Suematsu (2020) finds that financially and economically vulnerable local governments are more likely to attract donations by increasing their reciprocal gift ratios.

Of the few studies that have dealt with the economic behavior of local governments and MIC regulations, Fukasawa (2020) is notable. Fukasawa (2020) presents an economic behavior model that incorporates competition among local governments and an analysis using econometrically estimated parameters. Similar to the present study, Fukasawa (2020) examines the policy effects of the competition for reciprocal gifts and MIC regulations.

Previous studies have often adopted the tax competition model to examine the economic behavior of local governments.[2] The present study makes a novel contribution to literature by using a monopolistic competition

[1] Nishimura, Ishimura, and Akai (2017) provide an analysis of household behavior related to donations. Hashimoto (2022) analyzes the income redistribution effect of households of hometown tax donation.

[2] See Fukasawa et al.(2019), Kato and Yanagihara (2022) and Ayukawa (2022) for studies of tax competition models incorporating the hometown tax donation system.

model to examine the economic behavior of local governments eager to obtain donations for the analysis and the policy effects of MIC regulations.

The study proceeds as follows: Section 2 reviews the policy history of the hometown tax donation system and explains MIC regulations. Section 3 uses a monopolistic competition model to present a model of the economic behavior of local governments eager to obtain donations. Section 4 examines how our model behaves when its parameters are changed. Section 5 uses real-world data to clarify the policy effects of MIC regulations, and Section 6 concludes by summarizing the results of the analysis.

2. Policy history of the hometown tax donation system

This section presents a brief history of the hometown tax donation system.[3] The hometown tax donation system aims to help taxpayers express their gratitude and support for their hometowns and local governments, give taxpayers control over how their taxes are used, and encourage local governments to consider the improvement of their communities by promoting local initiatives. The hometown tax donation system supports the donations made by taxpayers and provides local governments with the opportunity to promote local initiatives to sustain their community. Based on this philosophy, the hometown tax donation system allowing the deduction of a donation of 2,000 yen from the income tax and inhabitant tax, was introduced.

However, events that followed frustrated the lofty idea. When the system began, local governments that received donation revenue started to send reciprocal gifts to donors. There were no regulations on the reciprocal gifts then, but local governments that offered goods with a very high reciprocal gift ratio attracted a large amount of donation revenue, which created a social problem called the competition for reciprocal gifts.

In 2015, the One-Stop Special Exception System was introduced to

[3] This section is based on the study by Kawase, Uemura, Ieki, and Ikeda (2023).

eliminate the need to file tax returns for deductions, accelerating the competition for reciprocal gifts. As Figures 1 and 2 confirm, this system led to a sharp increase in donation revenues and numbers.

In response to the competition for overheated reciprocal gifts, the MIC issued technical advice to local governments in April 2015 and April 2016, requesting that they not send highly cashable returns or reciprocal gifts with high reciprocal gift ratios. However, the situation did not improve; the competition for reciprocal gifts persisted due to the local governments' eagerness to obtain donations, prompting the MIC to consider regulations.

In April 2017, the MIC issued the Reciprocal Gift Ratio Rule (RR Rule), which would limit the reciprocal gift ratio to no more than 30% of the donation amount. This was followed by the Local Product Rule in April 2018, which limited local governments' return of goods to the items produced or services provided within their respective regions. However, the competition for reciprocal gifts continued.[4]

In response, in November 2018, the Council on Local Government Finance issued an opinion calling for the creation of a system in which local governments that did not comply with the RR Rule and the Local Product Rule would not be eligible for inhabitant income-tax deductions. The Outline for Tax Reform issued in December 2018 proposed that local governments that meet the rules be designated as eligible for the tax credit, and those that do would have this power revoked; in the same month, the Government Tax Reform Proposal was approved by the cabinet. The MIC submitted a bill for the partial revision of the Local Tax Law in 2019, which was approved by the Diet and enacted. The revised Local Tax Law, the designation of local governments participating in the hometown tax donation system, and the Appropriate Recruitment Rule (AR Rule) for reciprocal gifts came into effect

[4] Hashimoto and Suzuki (2018) highlight the existence of local governments that do not comply with the MIC notifications.

on June 1, 2019.

The AR Rule requires that the total cost of soliciting donations in each fiscal year equal an expense ratio of no more than 50% of the donation revenue received that fiscal year. Moreover, the designation of the local governments would be revoked if the donation did not comply with the RR, AR, or Local Product rules.

Figures 1 and 2 show that donation revenues and numbers were almost flat in FY 2018 and FY 2019, and the percentage increase in donation revenues was slower than in other years. From FY2020 onward, both the figures increased again, partly because of the increased demand caused by the COVID-19 lockdown restrictions. Nahari Town in Kochi Prefecture, Miyazaki Prefecture, and Sumoto City in Hyogo Prefecture were rescinded by the MIC in July 2020, January 2022, and May 2022, respectively, owing to the violation of the regulations.

In June 2023, the MIC notified that stricter regulations would be enforced from October 1, requiring that, in addition to a stricter Local Product Rule for aged meat and milled rice, the cost of sending documents required for the One-Stop Special Exception System, fees for intermediary websites, and personnel expenses for staff members who concurrently served as hometown tax donation system agents be included in the cost of the appropriate recruitment.

Given that the hometown tax donation system has turned into a “cat-and-mouse game” between the competition for reciprocal gifts and MIC regulations, this study analyzes how the MIC regulations affected the economic behavior of local governments eager to obtain donations, which triggered the competition for reciprocal gifts. The next section presents a model of their economic behavior.

3. A model of local government economic behavior in monopolistic competition

Local governments participating in the hometown tax donation system engage in a type of business activity in which they utilize resources within their local area and supply reciprocal gifts together with the participating companies.[5] While they act to maximize their net donation revenue, or gross donation revenue minus the total cost, households engage in donation behavior to obtain utility from the consumption of reciprocal gifts under a maximum donation income limit.

However, this assumption is incompatible with the original concept of the hometown tax donation system. Therefore, this study assumes that not all local governments engage in economic behaviors that maximize their net donation revenue, and those eager to obtain donations are bringing about the competition for reciprocal gifts.

This study focuses on the fact that many reciprocal gifts possess brand power.[6] For example, beef gifted by one local government is different from that gifted by another local government in brand or place of origin, although they are the same good. The lower the amount of donation per reciprocal gifts (donation price), the higher the number of donations from households, and thus, local governments that supply reciprocal gifts with strong brands have price dominance in setting the donation price. This market structure approximates a monopolistic competitive market.

Therefore, this study considers a monopolistic competitive market in which local governments supply reciprocal gifts when facing a household demand curve. Table 1 presents the characteristics of the three market structures: perfect competition, monopolistic competition, and monopoly. In a monopolistic competition, the number of firms is large, entry barriers are

[5] Some Sumoto city officials claimed during hearings that that their daily operations resembled those of a mail-order company. See Kawase, Uemura, Ieki, and Ikeda (2023).
[6] The survey of Sumoto City and other local governments confirms the importance placed on the brand power of the reciprocal gifts. For Sumoto City, it was the Awaji Island brand.

low, goods are differentiated, and price dominance exists. Profit maximization occurs when the marginal revenue and marginal cost are equal and the equilibrium is inefficient. Profits accrue in the short run but are zero in the long. Monopolistic competition is characterized as being somewhere between perfect competition and a monopoly, except for differentiation.

Table 1 around here

The monopolistic competition model proposed by Chamberlin (1933) was extended by Dixit and Stiglitz (1978) using a CES-type demand function and has been widely applied. Ottaviano et al. (2002) present an analytically tractable model of monopolistic competition under a quasi-linear utility function. This study applies the monopolistic competition model simplified by Ago (2008) to analyze local governments' economic behavior.

Figure 3 presents a diagram of the model, which assumes one type of market reciprocal gifts, the number of local governments n participating in the market for the reciprocal gifts, and subscripts of local governments $i \in [0,n]$. The vertical axis in Figure 3 represents the donation price p and cost, and the horizontal axis, the number of donations (production volume) of reciprocal gifts q, which reflects household consumption—households donate to obtain utility from consuming reciprocal gifts and the donation price p is the donation amount for each reciprocal gift.

Figure 3 around here

Total cost, TC, for local government i to procure and ship the number of reciprocal gifts for the number of donations (production volume) q is divided into procurement costs PC and other costs of reciprocal gifts OC. Assuming a marginal cost of procurement m^p, marginal cost of other costs m^o, fixed cost of procurement F^p, and fixed cost of other costs F^o,

we derive the equation:

$$TC_i = PC_i + OC_i = (m^p q_i + F^P) + (m^o q_i + F^O) \qquad (1).$$

Average total cost ATC is divided into the average procurement cost APC and the average other cost AOC.

$$ATC_i = \frac{TC_i}{q_i} = APC_i + AOC_i = \frac{PC_i}{q_i} + \frac{OC_i}{q_i} = \frac{m^p q_i + F^P}{q_i} + \frac{m^o q_i + F^O}{q_i}$$

$$= \frac{m^p q_i + m^o q_i}{q_i} + \frac{F^P + F^O}{q_i} = (m^p + m^o) + \frac{F^P + F^O}{q_i}$$

$$= MC + \frac{F^P + F^O}{q_i} \qquad (2)$$

Marginal cost MC is assumed to be linear for simplicity. Figure 3 shows the marginal cost curve $(m^p + m^o)$, marginal cost curve for procurement cost m^p, average total cost curve ATC, and average procurement cost curve APC. Both the average total cost and average procurement cost curves decrease asymptotically as the number of donations increases owing to fixed costs.

Net donation revenue Π is obtained by subtracting total cost TC from gross donation revenue TR.

$$\Pi_i = TR_i - TC_i \qquad (3)$$

Local government i maximizes its net donation revenue.[7] Owing to the monopolistic competitive model, local government i faces a household donation demand curve.[8]

For households, the following quasi-linear utility function is assumed, with quadratic partial utility U and quasi-linear and quadratic partial utilities as follows:

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[7] One might argue that when the residents of one local government donate to other local governments, resulting in an outflow of inhabitant tax revenue that is partially compensated by local allocation tax, it should be included in the model's calculation of net donation revenues. However, since the donation behavior of residents is beyond the control of their local governments, it is not considered in this study.

[8] Sumoto City stimulated the demand for donations by lowering the donation amount (donation price in the model) for certain reciprocal gifts when the hometown tax donation website held a bargain sale. Therefore, local governments are considered to have price control to manipulate donation prices to some extent.

$$U = \alpha \int_0^n q_i di - \frac{(\beta - \gamma)}{2} \int_0^n q_i^2 \, di - \frac{\gamma}{2} \left(\int_0^n q_i di \right)^2 + q_A \qquad (4)$$

where numeraire goods q_A and consumption (number of donations) q are the number of donations. The parameters of the utility function are $\alpha > m \geq 0$ and $\beta > \gamma \geq 0$ are constrained to be. The greater the number of local governments participating in the market for these reciprocal gifts, the greater the variety of reciprocal gifts and the higher the household utility. The larger the γ, the greater the substitutability of reciprocal gifts and the smaller the differentiation.

The household's budget constraint is expressed as the maximum contributable income M:

$$\int_0^n p_i q_i di + q_A = M \qquad (5).$$

In the hometown tax donation system, the maximum deduction amount is determined according to the income of individual households, defined as the maximum income that can be donated. Households choose between donating within the maximum donation income and consuming numeraire goods.

When the household utility is maximized under this budget constraint, a linear donation demand function is obtained.

$$p_i = \alpha - (\beta - \gamma) q_i - \gamma \int_0^n q_i di = \frac{a + cnP}{b + cn} + \frac{1}{b + cn} q_i, \qquad (6)$$

where the parameters are $a \equiv \frac{\alpha}{\beta + (n-1)\gamma}$, $b \equiv \frac{1}{\beta + (n-1)\gamma}$, $c \equiv \frac{\gamma}{(\beta - \gamma)\{\beta + (n-1)\gamma\}}$, and $P \equiv \frac{1}{n} \int_0^n p_i di$. As Ottaviano et al. (2002) show, the demand function obtained from the quasi-linear utility function is independent of income. Therefore, there is no income effect in this demand function, and the demand for donation q is determined by the donation price p. Figure 3 depicts a linear donation demand curve, DD, that falls to the right.

Based on the donation demand function q, donation revenue TR can be written as:

$$TR_i = p_i q_i = -\frac{1}{b+cn} q_i^2 + \frac{a+cnP}{b+cn} q_i \qquad (7).$$

The marginal donation revenue MR is:

$$MR_i = \frac{\partial TR_i}{\partial q_i} = -\frac{2}{b+cn} q_i + \frac{a+cnP}{b+cn} \qquad (8).$$

Figure 3 depicts the linear marginal donation revenue curve, MR, which falls to the right. When the local government i engages in economic behavior that maximizes net donation revenue Π, the number of donations q^* that maximizes net donation revenue is determined in an equilibrium where marginal donation revenue MR equals marginal cost $MC(= m^p + m^o)$.

$$q_i^* = \frac{a+cnP}{2} - \frac{b+cn}{2}(m^p + m^o) \qquad (9)$$

Figure 3 confirms that the number of donations q^* is determined at equilibrium point A, where the marginal donation revenue curve and marginal cost curve intersect. In this case, the donation revenue is rectangular p*Bq*O, and the net donation revenue considering the average total cost curve ATC is rectangular p*BDC.

This is the behavior of local government i when MIC regulations are not applied. In Figure 3, when the number of donations q^* is determined at point A, the expense ratio for the AR Rule is represented by the line Dq*/ Bq*, considering the average total cost curve ATC, and the expense ratio for the RR Rule is represented by the line Hq*/ Bq*, taking into account the average procurement cost curve APC.

Next, the study considers how the introduction of these regulations affects the behavior of local government i. When the AR Rule (total cost TC should be less than 50% of the donation revenue TR) parameter δ is set, the donation revenue is determined by the donation demand curve:

$$\delta TR_i = \delta p_i q_i \geq TC_i = PC_i + OC_i \qquad (10).$$

and per donation as:

$$\delta p_i \geq AC_i = (m^p + m^o) + \frac{F^P + F^O}{q_i} \qquad (11)$$

Figure 3 depicts a linear donation demand curve DD multiplied by parameter δ. This depicts a case in which there are two intersections with the average total cost curve ATC, at points E and F. Although there may be no intersection (solution) depending on the parameters, assuming that the number of donations satisfying the above conditions exists, the number of donations that comply with the rule can be obtained using the solution formula of the quadratic function. [9]

$$\frac{\frac{a+cnP}{b+cn} - \frac{1}{\delta}(m^p + m^o) - \sqrt{\left\{\frac{1}{\delta}(m^p + m^o) - \frac{a+cnP}{b+cn}\right\}^2 - \frac{4}{\delta}\frac{(F^P + F^O)}{b+cn}}}{2/(b+cn)} = q_i^{\delta min}$$

$$\leq q_i^{\delta} \leq \frac{\frac{a+cnP}{b+cn} - \frac{1}{\delta}(m^p + m^o) + \sqrt{\left\{\frac{1}{\delta}(m^p + m^o) - \frac{a+cnP}{b+cn}\right\}^2 - \frac{4}{\delta}\frac{(F^P + F^O)}{b+cn}}}{2/(b+cn)}$$

$$= q_i^{\delta max} \qquad (12)$$

$$q_i^{\delta *} = \frac{\frac{a+cnP}{b+cn} - \frac{1}{\delta}(m^p + m^o)}{2/(b+cn)} \qquad (13)$$

Here are the maximum $q_i^{\delta max}$ and minimum numbers $q_i^{\delta min}$ of donations that comply with the AR Rule, and $q_i^{\delta *}$ is the number of donations at the midpoint of both.

Figure 3 shows that there is a range from point T to point V in the number of donations q^{δ} that comply with the AR Rule, but the magnitude depends on the parameters. In the number of donations $q_i^{\delta *}$ at the midpoint, the expense ratio of the AR Rule is line G$q_i^{\delta *}$/line I$q_i^{\delta *} \leq \delta$. Therefore, the number of donations $q_i^{\delta *}$ complies with this rule.

Next, when the RR Rule (the cost of procuring reciprocal gifts PC

[9] The quadratic equation to be solved is:

$$\frac{q_i^2}{b+cn} + \left\{\frac{1}{\delta}(m^p + m^o) - \frac{a+cnP}{b+cn}\right\} q_i + \frac{1}{\delta}(F^P + F^O) = 0$$

should not exceed 30% of the donated revenue TR) parameter ε is set, given that donation revenue is determined by the donation demand curve, the rule is specified as:

$$\varepsilon TR_i = \varepsilon p_i q_i \geq PC_i \qquad (14).$$

and per donation as:

$$\varepsilon p_i \geq APC_i = m^p + \frac{F^P}{q_i} \qquad (15)$$

Figure 3 depicts a linear donation demand curve DD multiplied by the RR Rule parameter ε. It depicts a case in which there are two intersections with the average procurement cost curve, at points J and L. Assuming that the number of donations satisfying the above conditions, the number of donations q_i^{ε} that comply with the rule can be obtained by using the quadratic function solution formula. [10]

$$\frac{\frac{a+cnP}{b+cn} - \frac{1}{\varepsilon}m^p - \sqrt{\left(\frac{1}{\varepsilon}m^p - \frac{a+cnP}{b+cn}\right)^2 - \frac{4}{\varepsilon}\frac{F^P}{b+cn}}}{2/(b+cn)} = q_i^{\varepsilon min} \leq q_i^{\varepsilon}$$

$$\leq \frac{\frac{a+cnP}{b+cn} - \frac{1}{\varepsilon}m^p + \sqrt{\left(\frac{1}{\varepsilon}m^p - \frac{a+cnP}{b+cn}\right)^2 - \frac{4}{\varepsilon}\frac{F^P}{b+cn}}}{2/(b+cn)}$$

$$= q_i^{\varepsilon max} \qquad (16)$$

$$q_i^{\varepsilon *} = \frac{\frac{a+cnP}{b+cn} - \frac{1}{\varepsilon}m^p}{2/(b+cn)}, \qquad (17)$$

where the largest number of donations $q_i^{\varepsilon max}$ and the smallest number of donations $q_i^{\varepsilon min}$ that satisfy the RR Rule, and $q_i^{\varepsilon *}$ is the number of donations at the midpoint of both.

Figure 3 also shows that the number of donations q_i^{ε} complying with the RR Rule shows a range from point X to point Y, but the magnitude of

[10] The two equations to be solved are as follows:

$$\frac{q_i^2}{b+cn} + \left(\frac{1}{\varepsilon}m^p - \frac{a+cnP}{b+cn}\right)q_i + \frac{1}{\varepsilon}F^P = 0$$

these also depends on the parameters. For the number of donations $q_i^{\varepsilon*}$ at the midpoint, the expense ratio of the RR Rule is line K$q_i^{\varepsilon*}$/line N$q_i^{\varepsilon*}$≤ε. Therefore, the number of donations $q_i^{\varepsilon*}$ complies with the rule.

Now, let us examine the large/small relationship between the equilibrium number of donations q_i^* that maximizes net endowment income Π, the midpoint $q_i^{\delta*}$ of the number of donations conforming to the AR Rule, and the midpoint $q_i^{\varepsilon*}$ of the number of donations conforming to the RR Rule. The large/small relationship between q_i^* and $q_i^{\delta*}$ can be determined by organizing the parameters, as follows:

$$q_i^{\delta*} < q_i^* \qquad (18)$$

In addition, according to the MIC regulations, the total cost TC is 50% of the donation revenue TR under the AR Rule $(\delta = 0.5)$, and the procurement cost PC is within 30% of the donation revenue TR under the RR Rule $(\varepsilon = 0.3)$. According to these regulations, procurement expenses PC is larger than other expenses for the OC $(PC > OC)$. Owing to fixed costs, $PC > OC$ cannot be determined solely by calculating differences in marginal costs. For simplicity, I assume a relationship $m^p > m^o$ between the marginal cost m^p of procurement costs and the marginal cost m^o of other costs, and determine the relationship between the number of equilibrium donations q_i^*, the midpoint of the number of donations $q_i^{\delta*}$ complying with the AR Rule, and the midpoint of the number of donations $q_i^{\varepsilon*}$ complying with the RR Rule.

$$q_i^{\delta} < q_i^{\varepsilon} < q_i^* \qquad (19)$$

Figure 3 illustrates a case in which the above conditions are met, where the expense ratio based on the AR Rule has the relationship line G$q_i^{\delta*}$/line I$q_i^{\delta*}$ ≤ δ ≤ line $Wq_i^{\varepsilon*}$/line $Nq_i^{\varepsilon*}$ ≤ line Dq*/line Bq*, and the expense ratio based on the RR Rule has the relationship line S$q_i^{\delta*}$/line I$q_i^{\delta*}$≤ line K$q_i^{\varepsilon*}$/line N$q_i^{\varepsilon*}$≤ ε≤ line Hq*/line Bq*. Therefore, MIC regulations reduce the number of donations and the expense ratio.

If $q_i^{\delta} < q_i^{\varepsilon} < q_i^*$ is established, the regulations will have the effect of

suppressing the number of equilibrium donations q_i^*. However, this is not the case for all local governments. Suppose that local government j does not maximize its net donation revenue Π and the number of donations is q_j^{**} at that time, the same as the number of donations $q_j^{**} < q_j^{\delta} < q_j^{\varepsilon}$, then the number of donations q_j^{**} will not change even if the MIC regulations are introduced if the local government j is not enthusiastic about obtaining donations. [11] Therefore, it is necessary to confirm, using actual data, whether the MIC regulations changed the number of donations. Before doing so, I examine the movement of the model due to changes in the parameters.

4. Verification of model behavior by changing parameters

In this section, the same model using the behavior of local governments is employed to examine how the number of donations changes under equilibrium or MIC regulations. The basic analysis method is comparative statics, in which one parameter is varied and the others are fixed.

Specifically, the number of equilibrium donations q^* and the midpoint of the number of donations compliant with the MIC regulations ($q^{\delta*}$ or $q^{\varepsilon*}$), the maximum and minimum number of donations compliant with the MIC regulations ($q^{\delta max}$、$q^{\delta min}$、$q^{\varepsilon max}$、$q^{\varepsilon min}$) are differentiated by various parameters. The results are presented in Table 2, labeled "Increase" or "Decrease" depending on the sign condition, "No impact" for those that are not affected, "Unknown" for those for which the sign condition cannot be determined, and so on.

Table 2 around here

[11] The Sumoto City Third-Party Investigation Committee for the issue of the hometown tax donation system confirmed the existence of some local governments enthusiastic about obtaining donations and some that are not. Some local governments operate conservatively because of the MIC regulations, while others operate at the very edge of the regulations. Therefore, it cannot be assumed that all local governments follow the same model of economic behavior.

The first is an increase in the demand for donations. For example, the introduction of the One-Stop Special Exception System eliminating the need for tax returns falls under this category. In addition, the popularity of such reciprocal gifts may increase because of successful publicity by local governments. In Figure 2, the donation demand curve, DD, shifts upward to the right as donation demand increases. Table 2 shows the results of differentiating the number of each donation using the parameter a or α of the donation demand curve. The number of donations increased in all cases. An increase in the demand for donations increases their number, both in equilibrium and under MIC regulations.

The second is an increase in the number of local governments participating in the market for reciprocal gifts. In a monopolistic competitive market, reciprocal gifts are branded and differentiated. However, competition intensifies as the number of competing local governments increases; this increase can be expressed as an increase in parameter n. First, differentiating the donation demand curve by parameter n decreases; the donation demand curve DD in Figure 3 shifts to the left with an increase in the number of local governments. Table 2 shows the results of differentiating the number of donations by parameter n. The equilibrium number of donations, q^* decreases but the midpoint of the number of donations complying with the MIC regulations $q^{\delta*}$ and $q^{\varepsilon*}$ are not affected. This is because the average total cost curve for local government i remains the same as that of the number of local governments. The maximum and minimum numbers of donations complying with the MIC regulations have some impact, but the sign condition cannot be determined and is unknown.

The third factor is the tightening of the expense ratio in MIC regulations. The tightening of the expense ratio implies a decrease in the parameters δ and ε. For example, while up to 50% (or 30%) of the donation revenue was allowed for expenses (or procurement costs), only 40% (or 20%) tightened the expense ratio.

Table 2 shows the results of differentiating the number of donations by parameters δ and ε, respectively. Stricter expense ratios have no effect on the equilibrium number of donations q^* but the number of donations complying with MIC regulations has decreased. Figure 3 shows the donation demand curves multiplied by the AR Rule and the RR Rule parameters. When the average total cost and average procurement cost curves are constant, a stricter expense ratio for MIC regulations decreases the number of donations.

The fourth is an increase in total expenses. This section examines the impact of an increase in total costs owing to factors affecting the number of donations. Total costs are divided into marginal and fixed costs, with marginal costs varying with the number of donations and fixed costs not varying with the number of donations. [12]

Stricter recruitment rules result in increased total costs. For example, including the cost of shipping documents for the One-Stop Special Exception System, effective October 1, 2023, and the fees of intermediary websites at the cost of appropriate recruitment expenses increase marginal cost. In addition, including labor costs for staff who concurrently work for hometown tax donation systems increases fixed costs when included in appropriate recruitment expenses.

The first is an increase in marginal cost. The results of differentiating the number of donations by the marginal cost of procuring reciprocal gifts m^p or the marginal cost of other expenses m^o, are declining, as shown in Table 2. When the marginal cost curve shifts upward in Figure 3, the number of donations decreases both in equilibrium and under MIC regulations.

The second factor is the increase in fixed costs. Table 2 shows the results of differentiating the number of donations by the fixed cost of procuring reciprocal gifts F^P or the fixed cost of other expenses F^O. The

[12] According to Kawase, Uemura, Ieki, and Ikeda (2023), total costs include costs of procurement, packaging, shipping, portal site posting, labor and commissions, and credit fees. Non-labor costs are considered marginal costs, while labor costs are fixed.

number of donations q^* that maximize net donation revenue and the midpoint of the number of donations $q^{\delta*}$ and q^{ε} that comply with the regulations do not affect the number of donations.

However, an increase in the fixed cost parameters affects the range of the number of donations that comply with the MIC regulations because the square root of the third term in the numerator contains fixed costs for the maximum and minimum number of donations under the MIC regulations. An increase in the fixed cost parameters reduces the square root of the third term in the numerator, and the range of donations compliant with the regulations.

Figure 3 depicts the linear donation demand curve DD multiplied by the parameters of the AR Rule and the RR Rule, as if there were two intersections with the average total cost curve or the average procurement cost curve; however, as fixed costs increase, the widths of the two intersections decrease. Furthermore, as fixed costs increase, the square root of the third term in the numerator becomes an imaginary number, the two curves do not intersect, and contributions complying with the MIC regulations cease to exist. The larger the fixed cost, the smaller is the possibility of the number of donations able to comply with MIC regulations.

This analysis is an examination of the changes in the number of donations in equilibrium or MIC regulations for changes in the parameters, and is based on the assumption that local governments eager to obtain donations will act to maximize their net donation revenue. Since all local governments are unlikely to be eager to obtain donations, I next focus on the local governments enthusiastic about obtaining donations by analyzing the data on the impact of the MIC regulations on the number of donations.

5. Data analysis of the policy effects of the introduction of the MIC regulations

The economic behavior model of local governments in Section 3 represents local governments maximizing their net donation revenue.

Therefore, in this study, I would like to rank local governments by net donation revenue and find local governments eager to obtain donation revenue in this ranking. Next, I examine the policy effects of the MIC regulations. [13]

The number of donations q in the model is 'number of donations' per local government in the "Survey on Current Status of Hometown Tax Donation System" by the MIC from FY2016 to FY2021, for which unified data can be obtained. The 'donation amount' is the donation revenue TR, 'cost of procurement of reciprocal gifts, and so on.' is the procurement cost PC, and 'total cost' is the total cost TC. Consequently, net donation revenue $\Pi(=TR-TC)$, other expenses $OC(=TC-PC)$, expense ratio based on the AR Rule TC/TR and the RR Rule PC/TR are calculated.

Here, variables that represent total donation revenue, such as donation revenue and net donation revenue, are expressed on a per-resident basis, allowing for comparisons between local governments. [14] Maximizing net donation revenue per capita, rather than the total net donation revenue, is rational for local governments keen to secure per capita financial resources. Net donation revenue per capita is obtained by dividing net donation revenue by the MIC's Basic Resident Ledger Population for each year; local governments with no donations were excluded.

The number of local governments is 1,785 in FY 2016, 1,787 in FY 2017, 1,785 in FY 2018, 1,787 in FY 2019, 1,788 in FY 2020, and 1,786 in FY 2021. Given that not all of them are enthusiastic about the hometown tax donation system, I limited the data to the top 1,000. In addition, I ranked the top 1,000 per capita net donation revenues for each fiscal year and created

[13] Hashimoto and Suzuki (2021) report the impact of the MIC regulations on return ratios and donation revenue.

[14] For example, Nihon Keizai Shimbun published a ranking of "real income and expenditure" (donation revenue - expenses - inhabitant tax deduction) per resident. "Hometown tax donation system, Kitayama Village, Wakayama Prefecture, with a population of 400, is the top earner in terms of tax payments: Regional Revitalization Read with Data," *Nihon Keizai Shimbun*, October 6, 2023.

10 datasets divided by 100. The total donation revenue of the top 1,000 local governments in terms of per capita net donation revenue for each fiscal year amounts to approximately 90% of the total donation revenue.

According to the model of economic behavior of local governments, the MIC regulations reduced the expense ratio more than the equilibrium that maximizes the net donation revenue per capita, as Figures 4 and 5 show. Figure 4 shows the change in the expense ratio based on the AR Rule for the top-ranking net donation revenue per capita, and Figure 5 shows the change in the expense ratio based on the RR Rule.

Prior to the MIC regulations, until FY 2018, the higher the expense ratio of the AR Rule (Figure 4) and the higher the expense of the RR Rule (Figure 5), the higher the ranking of the net donation revenue per capita. That a higher expense ratio can generate more per capita net donation revenue is consistent with the economic behavior model.

Figure 4 around here

Figure 5 around here

Figures 4 and 5 show that post-MIC regulations, the expense ratio of the AR Rule was 50% or less and the expense ratio of the RR Rule dropped to 30% or less, following which net donation revenue changed significantly. Figure 6 shows the change in the share of the net donation revenue: in FY 2018, the top 1–100 local governments in the per capita net donation revenue ranking had a share of about 50% of net donation revenue, but after FY 2019, the share dropped to about 30%. The MIC regulations worked for the top local governments in this ranking.

Figure 6 around here

In the economic behavior model of local governments, the

introduction of MIC regulations decreased the number of donations. Therefore, I examine the number of donations before and after the regulations, focusing on FY 2018 and FY 2019.

Table 3 shows the average number of donations and average change in net donation revenue per capita for the top 1,000 rankings in FY 2018. The number of donations decreased for local governments ranked 1–100 and 101–200, and net donation revenue decreased for local governments ranked 1–100, consistent with the economic behavior model of local governments eager to obtain donations. These governments had been maximizing net donation revenue per capita prior to FY 2018 but were forced to reduce the number of donations after the regulations.

Table 3 around here

However, the number of donations increased in local governments ranked 201st and beyond, for those who had not taken action to maximize per capita net donation revenue and had room to increase the number of donations even after the regulations.

Based on the above discussion, the top 1–100, and at most the top 1–200 local governments ranked by per capita net donation revenue acted in accordance with the economic behavior model eager to obtain donations. Among the 1,700 local governments, some may have accelerated the competition for reciprocal gifts.

6. Conclusion

This study focuses on the challenges surrounding the hometown tax donation system, an important element of Japan's local government finance that has turned financially sustainable due to excessive competition for reciprocal gifts. I argue that the problem originates from the economic behavior of the local governments eager to obtain donations. I present a

model of the economic behavior of such local governments, verify the movement of the model using parameters, and confirm through the use of data that such governments exist. I also examine the policy effects of the MIC regulations using the economic behavior model and data.

To summarize the results, first, I present a model of local governments' economic behavior assuming that hometown tax-reciprocal gifts are in a monopolistic competitive market. Local governments are eager to obtain donations and act to maximize net donation revenue. As reciprocal gifts have brand power and a lower donation price attracts more donations, local governments face a household demand curve for donations. In this model, I present how the equilibrium number of donations that maximizes net donation revenue and the number of donations under MIC regulations are determined and show that the latter is smaller than the former.

Second, using this model, I examine how the equilibrium number of donations and the number of donations under MIC regulations change when several parameters vary. Increased demand for donations, such as the introduction of the One-Stop Special Exception System, increases the number of donations. An increase in the number of local governments participating in the reciprocal gifts market decreases the number of donations. Stricter MIC regulations do not change the equilibrium number of donations, but decreases the number of donations. An increase in marginal cost decreases the number of donations. An increase in fixed costs narrows the range of contributions compliant with MIC regulations.

Third, I analyze the policy effects of introducing MIC regulations using data. Ranked by net donation revenue per capita, the data show that before the regulations, the higher the ranking, the higher the expense ratio, and the higher the expense ratio, the higher the net donation revenue. This is consistent with the model of local government economic behavior. Afterwards, the expense ratio of the local governments decreases, and the net donation revenue share of those in the top 100 decreases from

approximately 50% to 30%. Local governments in the top 200 particularly see a decrease in the number of donations owing to MIC regulations. These results are consistent with the economic behavior model and suggest that the regulations effectively reduced donation revenues and numbers, especially for the governments eager to obtain donations. Although not all of the 1,700 local governments are enthusiastic about obtaining donations, some are accelerating the competition for reciprocal gifts.

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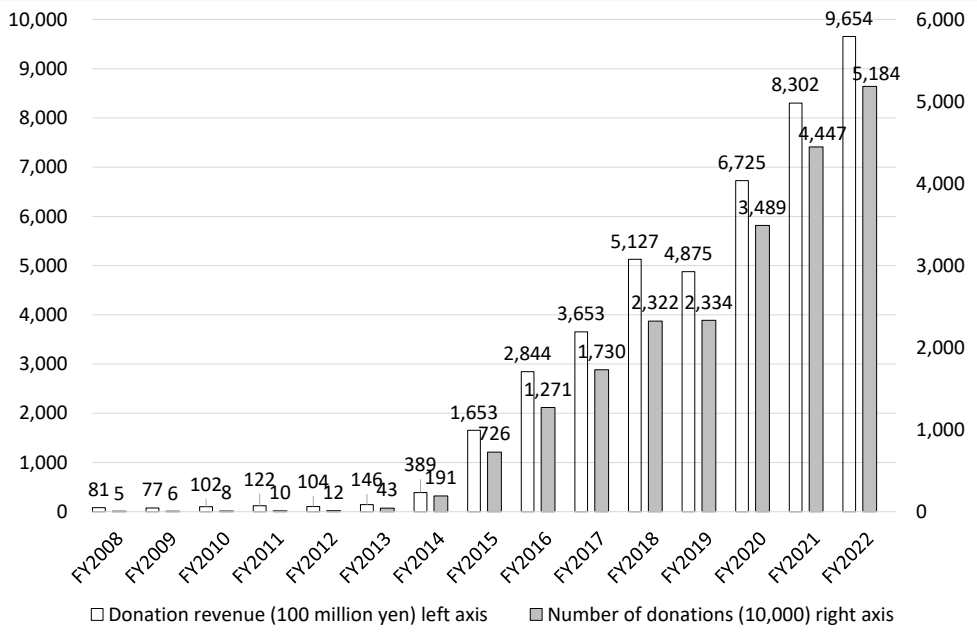
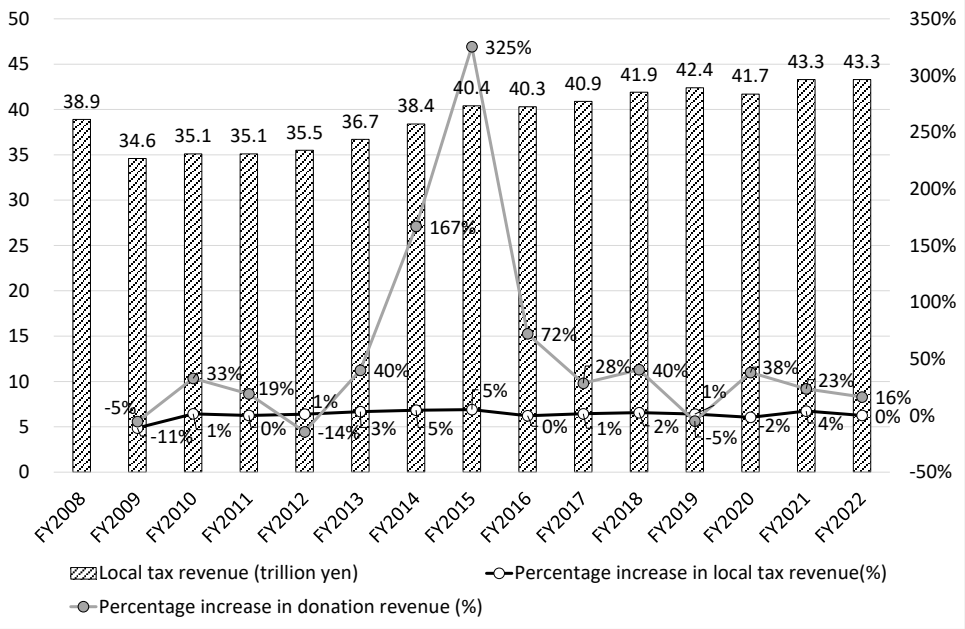
Figure 1 Donation revenue and the number of donations



Note: Compiled from the MIC "Results of Survey on Current Status of Hometown Tax Donation System" (each fiscal year version).

Figure 2. A comparison of local tax revenue and donation revenue



Note: Compiled from the "Results of Survey on Hometown Tax Donation System" (each fiscal year version) and data from the MIC. Local tax revenue includes special concession taxes for local corporations and corporate business concession taxes.

Table 1: Market structure characteristics of perfect competition, monopolistic competition, and monopoly

	Perfect competition	Monopolistic competition	Monopoly
Number of firms	Many	Many	One
Barriers to entry	Low	Low	Very high
Differentiation of goods	None	Yes	None
Power of price	None	Some	Yes
Profit maximization condition	Price = Marginal revenue = Marginal cost	Marginal revenue = Marginal cost	Marginal revenue = Marginal cost
Profit	Positive profit in the short term but zero in the long term	Positive profit in the short term but zero in the long term	Monopoly profits
Efficiency	Yes	None	None

Figure 3: Monopolistic competitive market for reciprocal gifts

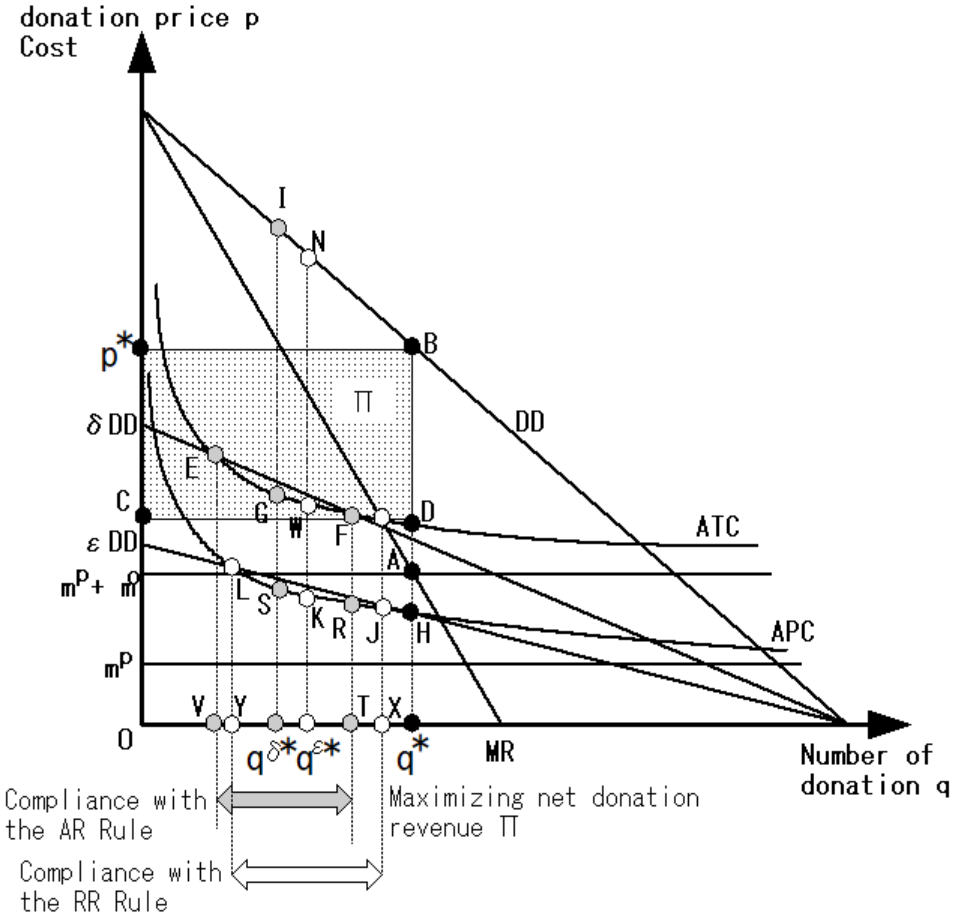


Table 2: Change in the number of donations due to changes in parameters

	Number of equilibrium donations q^* that maximize net donation revenue Π	Midpoint of the number of donations $q^{\delta*}$ in compliance with the AR Rule	Midpoint of the number of donations $q^{\varepsilon*}$ in compliance with the RR Rule	Largest and smallest number of donations $q^{\delta max}$, $q^{\delta min}$, $q^{\varepsilon max}$, and $q^{\varepsilon min}$ in compliance with the MIC regulations
(1) Increase in demand for donations Parameters: Increase of a or α Figure 3: Upper rightward shift of the donation demand curve Example: Introduction of the One-stop Special Exception System	Increase	Increase	Increase	Increase
(2) Increase in the number of local governments participating in the relevant reciprocal gifts market Parameters: Increase of n Figure 3: Lower leftward shift of the donation demand curve Example: Entry of other local governments with brand power	Decrease	No impact	No impact	Unknown
(3) Stricter expense ratios for the AR Rule and the RR Rule Parameters: Decrease of δ or ε Figure 3: Left rotational shift of donation demand curve multiplied by the parameters Example: Lower expense ratios for the AR Rule and the RR Rule	No impact	Decrease	Decrease	Decrease
4-1) Increase in marginal cost Parameters: Increase of m^p or m^o Figure 3: Upward shift of marginal cost curve Example: Including the cost of sending documents for the One-Stop Special Program in the cost of the appropriate recruitment standard.	Decrease	Decrease	Decrease	Decrease
4-2) Increase in fixed costs Parameters: Increase of F^P or F^O Figure 3: Upward shift of the average total cost curve Example: Inclusion of labor costs of concurrently employed employees who perform hometown tax donation system duties in appropriate recruitment expenses	No impact	No impact	No impact	The range of the number of donations compliant with the AR Rule becomes smaller, and a solution (intersection) may no longer exist.

Figure 4: Expenses ratio based on the AR Rule

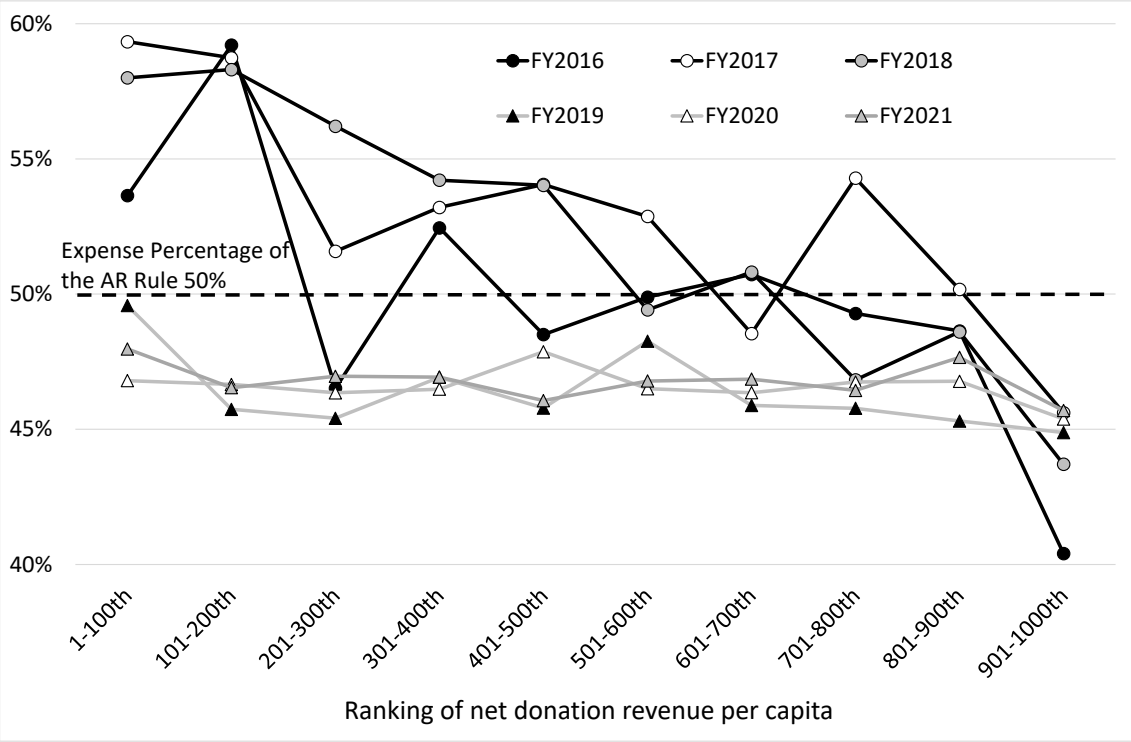


Figure 5: Expenses ratio based on the RR Rule

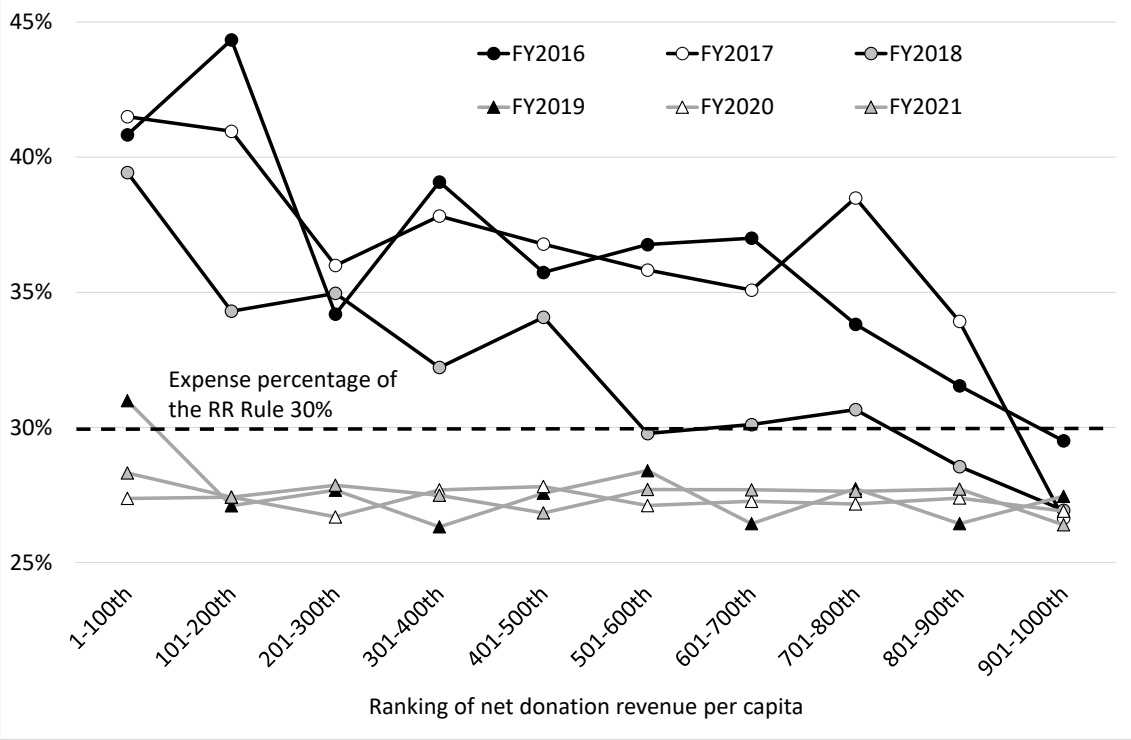


Figure 6: Trends in the share of net donation revenue

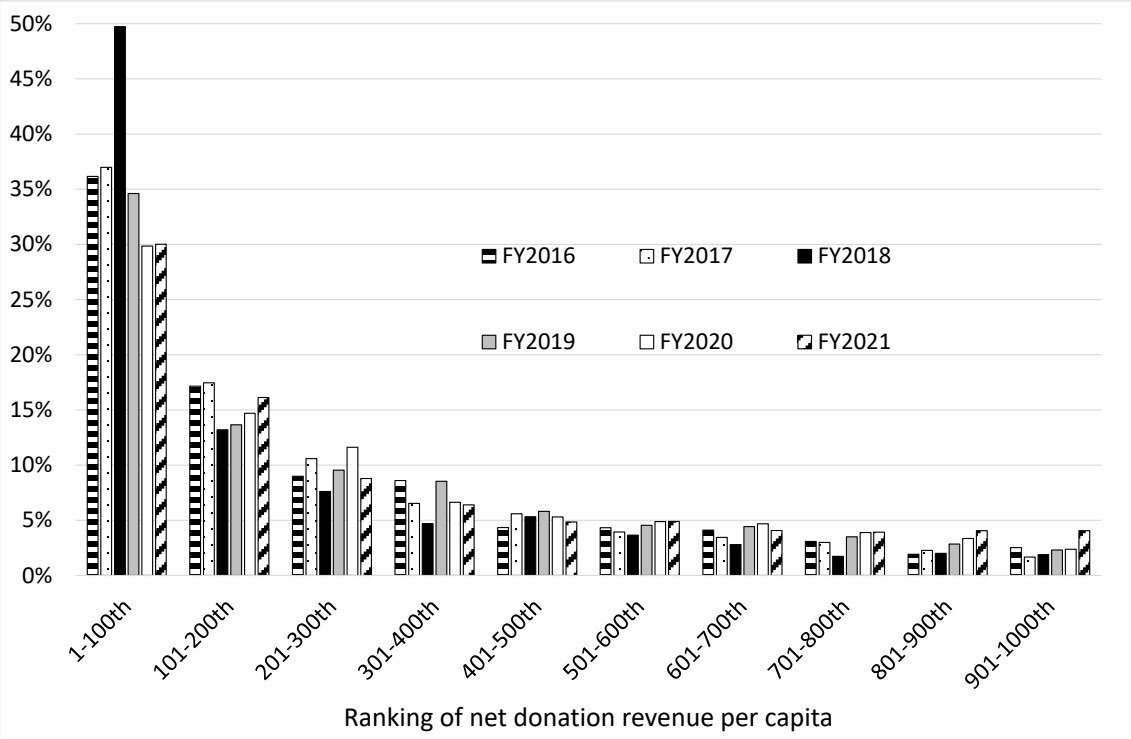


Table 3: Top 1-1,000 local governments ranked by per capita net donation revenue

Ranking in FY2018 by per capita net donation revenue	Average number of donations (cases)			Average net donation revenue per capita (yen)		
	FY2018	FY2019	Change (rate of change)	FY2018	FY2019	Change (rate of change)
1–100th	104,545	65,330	-39,215 (-37.51%)	106,834	57,163	-49,671 (-46.5%)
101–200th	36,382	35,934	-448 (-1.23%)	14,725	22,185	+7,460 (+50.7%)
201–300th	19,777	22,098	+2,321 (+11.74%)	8,215	11,507	+3,292 (+40.07%)
301–400th	13,622	16,999	+3,377 (+24.79%)	5,440	9,264	+3,824 (+70.29%)
401–500th	12,988	16,807	+3,819 (+29.40%)	4,046	6,889	+2,843 (+70.27%)
501-600th	8,557	14,899	+6,342 (+74.11%)	3,033	6,297	+3,264 (+107.62%)
601–700th	6,906	10,736	+3,830 (+55.46%)	2,116	4,242	+2,126 (+100.47%)
701–800th	3,678	5,654	+1,976 (+53.72%)	1,567	2,780	+1,213 (+77.41%)
801–900th	4,784	9,623	+4,839 (+101.15%)	1,234	2,201	+967 (+78.36%)
901–1,000th	5,020	8,017	+2,997 (+59.70%)	984	1,792	+808 (+82.21%)

Note: Compiled from the MIC's Survey of the Current Status of Hometown Tax Donation and the Basic Resident Ledger Population for each fiscal year.