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Abstract

This paper theoretically analyzes the effect of industrial distribution on local governments' decisions regarding intermunicipal cooperation and the amount of transfers to promote cooperation. When considering two regions, each region may not desire inter-municipal cooperation. Industrial location and national transfer induce the local government to accept such cooperation.

The results depend on the population and income determined by the firm's location. When the benefit of cooperation takes time to realize, the central government should make a transfer to each local government. Then, the transfer amount decreases if the regional population differential is smaller, the smaller region's income is sufficiently larger, and the total population of both regions is larger. Increasing the effect of transfers requres not only the regional population but also the regional income.

JEL classification: H41, H73, R12, R32

Keywords: Inter-municipal cooperation; Local public goods; Industrial distribution; Consolidation

1 Introduction

This paper analyzes the intermunicipal cooperation expected to achieve financial efficiency and cost savings. Recently, municipalities have been expected to provide public services through cost efficient methods under political and economic pressure. Some local public services are recognized as having economies of scale (e.g., Solé-Ollé and Bosch (2005) and Andrews and Boyne (2011)). For many small municipalities, intermunicipal cooperation is a policy through which economies of scale can be exploited. Some empirical studies (e.g., Allers and Greef (2018), Bel and Warner (2015) and Niaounakis and Blank (2017)) show the relationship between intermunicipal cooperation and economies of scale.

A common method used to address these problems is consolidating municipalities. However, recent studies (e.g., Bless and Baskaran (2016), Miyazaki (2018)) show that such consolidation has no effect on cost efficiency. Moreover, some municipalities do not want to consolidate because they would prefer decentralization. In these circumstances, intermunicipal cooperation is an alternative policy (e.g., Ferraresi et al.

(2018), Silvestre et al. (2020)).

In fiscal decentralization, the problem is whether intermunicipal cooperation is realized voluntarily. Belgholz and Bischoff (2018) find that local council members in German municipalities may oppose intermunicipal cooperation. Furthermore, Blåka (2017) show that transaction costs from cooperation may be larger than the benefits. In these cases, municipalities will not want to cooperate. If cooperation is not voluntary, it should be implemented compulsorily. This paper analyzes whether a transfer policy from the central government to local governments effectively fosters cooperation.

This paper theoretically analyzes the effect of industrial distribution on local governments' decisions regarding intermunicipal cooperation and the amount of transfers to promote cooperation. We analyze a two-region model in which the local government provides local public goods in each region. The two regions (e.g., a city and suburb) differ in terms of population size and industrial distribution. Initially, we assume that industry agglomerates in the larger region, and the income in that region is greater than that in the smaller region because of industrial agglomeration. Moreover, we assume that intermunicipal cooperation requires the consent of both regions. In these cases, one region may oppose intermunicipal cooperation because of costs. However, if industrial dispersion occurs, each region's income increases, and the relative cost of cooperation decreases. Then, that region may approve intermunicipal cooperation, which would be implemented voluntarily. This paper analyzes these effects.

Moreover, this paper analyzes whether industrial dispersion decreases the transfer amount required to promote intermunicipal cooperation. When it is not implemented voluntarily, the central government should provide transfers to local governments to realize intermunicipal cooperation. When the income of a smaller region is lower owing to industrial agglomeration, that region will often fiercely oppose intermunicipal cooperation. In such cases, the approval of the smaller region will require a larger transfer amount. However, if industrial dispersion increases the smaller region's income, the transfer amount would decrease. This paper analyzes these effects.

The remainder of this paper is organized as follows. Section 2 presents the models used in this paper. Section 3 analyzes the behavior of local governments regarding intermunicipal cooperation. Section 4 introduces transfers to local governments. Finally, Section 5 presents concluding remarks.

2 The model

2.1 Model specification

The model used in this paper follows that of Takatsuka (2014). This model considers an economy with two regions (Regions 1 and 2), in which each individual in the economy consumes three goods: manufactured, agricultural, and local public goods.

Manufactured and agricultural goods are provided in the exogenous national market. Initially, the manufacturing sector agglomerates in Region 1. The production function for manufactured goods is as follows:

$$X_1 = \left\{ \int_0^{N_1} q_j^{\rho} dj \right\}^{\frac{1}{\rho}} \qquad 0 < \rho < 1$$

where q_j denotes the intermediate goods j ($j \in [0,\ N_1]$) and N_1 is the variety of intermediate goods. Firms that produce intermediate goods are initially located in Region 1, indicating that the manufacturing sector agglomerates in that region. One intermediate good is produced by one firm. Monopolistic competition exists in the intermediate goods market. The production function of each intermediate good is as follows:

$$L_{q_j} = f + bq_j$$

where L_{q_j} is the labor input, f is the fixed labor input, and b is the marginal labor input.

An intermediate goods producer can relocate to Region 2. When producers are dispersed in each region, the production function of manufactured goods is as follows:

$$X_1 = \left\{ \int_0^{N_1} q_j^{\rho} dj + \int_0^{N_2} q_k^{\rho} dk \right\}^{\frac{1}{\rho}}$$

where q_k is the intermediate good k $(k \in [0,\ N_2])$ produced in Region 2. N_i is the variety of intermediate goods produced in Region i $(i = 1,2)$. To use the goods produced in Region 2, the producer must pay the iceberg transportation cost, $\tau > 1$.

The production function of agricultural good z is as follows: $z = L_z$, where L_z is the labor input. The labor market is competitive in both regions. When intermediate goods producers pay higher wages than agricultural producers, the region does not produce agricultural goods, instead importing them from the national market. Conversely, when intermediate goods producers are not located in a region, agricultural producers can use local labor, and the region produces agricultural goods.

Each individual in each region supplies one unit of labor and cannot migrate across regions. The total population is represented by $\bar{L} = \mathrm{L}_1 + \mathrm{L}_2$, where $L_i \quad (i = 1,2)$ is region i's population. This paper assumes that $L_1 > L_2$.

Individuals in Region i have the following utility function:

$$U_i = x_i^{\alpha} z_i^{1-\alpha} G_i$$

where x_i is the manufactured good, z_i is the agricultural good, and G_i is the local public good. The budget constraint for an individual is as follows:

$$(1 - t_i)w_i = p_x\, x_i + p_z\, z_i$$

where p_x is the price of the manufactured good, p_z is the price of the agricultural good, w_i is the wage, and t_i is the tax rate.

Initially, the manufacturing sector agglomerates in Region 1. In the equilibrium, the wage in Region 1 is as follows:

$$w_1^a = p_x \frac{\rho}{b} \left\{\frac{1-\rho}{f}\right\}^{\frac{1-\rho}{\rho}} L_1^{\frac{1-\rho}{\rho}} \qquad (1)$$

In the following, w_1^a reflects the wage in Region 1 in the agglomerated case. Moreover, it is assumed that $p_z = 1$. Then, in Region 2, wage w_2^a is 1.

Next, the case in which intermediate producers disperse in each region is analyzed.

In the equilibrium, the wage in each region is as follows:

$$w_1^d = p_x \frac{\rho}{b} \left\{ \frac{1-\rho}{f} \right\}^{\frac{1-\rho}{\rho}} [L_1 + L_2 \tau^{-\rho}]^{\frac{1-\rho}{\rho}} \quad (2)$$

$$w_2^d = \tau^{-\rho} p_x \frac{\rho}{b} \left\{ \frac{1-\rho}{f} \right\}^{\frac{1-\rho}{\rho}} [L_1 + L_2 \tau^{-\rho}]^{\frac{1-\rho}{\rho}} \quad (3)$$

Comparing equation (1) and equation (2), we can observe that equation (2) is larger than equation (1). The dispersion of manufacturing sector increases the wage in Region 1. When the manufacturing sector disperses in equilibrium, equation $(3) > w_2^a = 1$, meaning that the dispersion increases the wage in Region 2. Moreover, equation (2) and equation (3) show that $w_1^d / w_2^d = \tau^\rho > 1$. This means that the wage in Region 1 is greater than that in Region 2 in the case of dispersion.

Initially, all firms are assumed to produce intermediate goods agglomerate in Region 1. However, these firms can relocate to Region 2. In the equilibrium, this case (dispersed) is realized when a higher wage is created in Region 2 than in the agglomerated case. From equation (3), if transportation cost τ decreases sufficiently, firms disperse across regions.

2.2 Behavior of local government

The local government of each region can produce local public goods. Following Titman and Zhu (2024), the production function is as follows:

$$G_i = \tilde{A}{L_i}^{\lambda}{X_{G_i}}^{\gamma} = A_i{X_{G_i}}^{\gamma} \qquad (4)$$

where $\tilde{A}$ is the exogenous productivity, λ is the parameter that shows the population's economies of scale, and $\tilde{A}{L_i}^{\lambda} = A_i$ is total factor productivity (TFP). X_{G_i} is the manufactured good input, and γ is the parameter that shows the input's economies of scale. The local government's budget constraints are as follows:

$$t_i w_i L_i = p_x\, X_{G_i}$$

The local government maximizes individual utility in its own region.

In Region i, the local government provides the local public good. From the model specifications, the local government's issue is as follows:

$$\max_{t_i} V_i = \left(\frac{\alpha}{p_x}\right)^{\alpha}\left(\frac{1-\alpha}{p_z}\right)^{1-\alpha}(1-t_i)w_i\left(\frac{t_i w_i L_i}{p_x}\right)^{\gamma} A_i$$

where V_i is the indirect utility in Region i. From the first-order condition of this problem, the tax rate is $t_i = \gamma/(\gamma+1)$ and the following is obtained:

$$G_i = \left[\frac{\gamma w_i L_i}{(\gamma+1)p_x}\right]^{\gamma} A_i$$

Then, the utility is provided as follows:

$$V_i = \left(\frac{\alpha}{p_x}\right)^{\alpha}\left(\frac{1-\alpha}{p_z}\right)^{1-\alpha}\frac{{w_i}^{\gamma+1}{L_i}^{\gamma}}{\gamma+1}\left[\frac{\gamma}{(\gamma+1)p_x}\right]^{\gamma} A_i \qquad (5)$$

2.3 Local government cooperation

In this model, each local government can cooperate to produce local public goods. Following Titman and Zhu (2024), the cooperation effect is modeled as a production externality that makes TFP an increasing function of the total population of the two regions. The production function is as follows:

$$G_i = \tilde{A}(L_1 + L_2)^{\lambda} {X_{G_i}}^{\gamma} \qquad (6)$$

Owing to cooperation in the population's economies of scale, the local government can utilize both regions' total population $\bar{L} = \mathrm{L}_1 + \mathrm{L}_2$ instead of its own region's population. To utilize cooperation, each local government should pay cost cL_1, where c reflects the per capita cost. Intuitively, this is the transaction cost of cooperation (e.g., Bel and Warner (2015)).

Cooperation is realized when each region wishes to carry this out. First, we analyze the case in which Region 1's local government accepts it. When cooperation is implemented, the local government in Region 1 maximizes its utility. The budget constraints for Region 1's local government is as follows:

$$t_1 w_1 L_1 = p_x X_{G_1} + cL_1$$

where cL_1 reflects the transaction cost of cooperation. The local government's issue is as follows:

$$\max_{t_1} V_1 = \left(\frac{\alpha}{p_x}\right)^{\alpha} \left(\frac{1-\alpha}{p_z}\right)^{1-\alpha} (1-t_1) w_1 \left(\frac{t_1 w_1 L_1 - cL_1}{p_x}\right)^{\gamma} \tilde{A}\bar{L}^{-\lambda}$$

Similar to the previous section, the tax rate is as follows:

$$t_1 = \frac{\gamma + \frac{c}{w_1}}{\gamma + 1}$$

Compared to the previous section, the tax rate is higher. Local governments should increase their tax rates because of transaction costs. Economies of scale do not reduce public expenditure, although they can enhance the level of public goods. The local public good amount is as follows:

$$G_1 = \left[\frac{\gamma (w_1 - c) L_1}{(\gamma + 1) p_x}\right]^{\gamma} \tilde{A}\bar{L}^{\lambda}$$

Then, the utility V_{1j} is as follows:

$$V_{1j} = \left(\frac{\alpha}{p_x}\right)^{\alpha}\left(\frac{1-\alpha}{p_z}\right)^{1-\alpha}\frac{1-\frac{c}{w_1}}{\gamma+1}{w_1}^{\gamma+1}{L_1}^{\gamma}\left[\frac{\gamma\left(1-\frac{c}{w_1}\right)}{(\gamma+1)p_x}\right]^{\gamma}\tilde{A}\bar{L}^{-\lambda} \qquad (7)$$

When utility (7) is larger than the utility in non-cooperation case (5), the local government cooperates.

Second, we analyze the policy of Region 2's local government. Similar to Region 1, the tax rate is as follows:

$$t_2 = \frac{\gamma + \frac{c}{w_2}}{\gamma + 1}$$

Similar to Region 1, cooperation does not reduce public expenditure, although it can enhance the level of public goods. The utility is as follows:

$$V_{2j} = \left(\frac{\alpha}{p_x}\right)^{\alpha}\left(\frac{1-\alpha}{p_z}\right)^{1-\alpha}\frac{1-\frac{c}{w_2}}{\gamma+1}{w_2}^{\gamma+1}{L_2}^{\gamma}\left[\frac{\gamma\left(1-\frac{c}{w_2}\right)}{(\gamma+1)p_x}\right]^{\gamma}\tilde{A}\bar{L}^{-\lambda} \qquad (8)$$

3 Effect of regional population distribution on cooperation

This section analyzes when cooperation is realized. First, we analyze whether Region 1's local government accepts it. From the model specification, the relative utility is as follows:

$$\frac{V_{1j}}{V_1} = \left(1 - \frac{c}{w_1}\right)^{\gamma+1} \left(\frac{\bar{L}}{L_1}\right)^{\lambda} \qquad (9)$$

When (9) is greater than 1, Region 1's local government wishes to cooperate.

On the right-hand side of equation (9), the first term represents the effect of the cost of cooperation and the second term represents the benefit of cooperation. If $L_1 = \bar{L}$, the second term is 1 and Region 1's benefit disappears. This means that Region 1 does not want to cooperate in the case of full population agglomeration. Conversely, if $L_1 = \bar{L}/2$, the second term maximizes in the range of $\bar{L}/2 \leq L_1 \leq \bar{L}$. We assume that equation $(9) > 1$ when $L_2 = \bar{L}/2$. This is realized if cooperation does not have a small effect.

Consider L_1^* that is the sole solution to the equation $(9) = 1$ in the range of $\bar{L}/2 \leq L_1 \leq \bar{L}$. From the previous analysis, when the population is smaller than L_1^*, Region 1 should accept cooperation. Conversely, when the population is larger than L_1^*, Region 1 should not accept it.

Next, we analyze the case in Region 2 and consider that in which the manufacturing sector agglomerates in Region 1. Similar to Region 1, the relative utility is as follows:

$$\frac{V_{2j}}{V_2} = (1-c)^{\gamma+1}\left(\frac{\bar{L}}{L_2}\right)^{\lambda} \qquad (10)$$

where $w_2 = 1$. When the effect of cooperation is not small, (10)>1 in the range of $0 \leq L_2 \leq \bar{L}/2$.

To summarize these results, the following proposition is obtained.

Proposition 1

Only when the regional population differential is small does each region's local government accept cooperation.

The local government of the smaller region will always accept cooperation. Therefore, cooperation is realized if the local government of the larger region wants it. When population agglomeration is almost perfect, the benefits of cooperation almost disappear. However, when population agglomeration is imperfect, the local government of the larger region accepts cooperation.

4 Long-term effect of cooperation and transfers

The previous section shows that each region's local government accepts cooperation if the regional population differentials are small. However, the benefits of cooperation take time to materialize because relationships take time to create and develop. Thus, cooperation may not be realized in the short-term, despite being desirable in the long-term. In this case, a transfer from the central government is reasonable for realizing cooperation. This section analyzes such a transfer when the benefits of cooperation take time to be realized.

To modify the previous section’s model, we assume that the cooperation effect is realized perfectly in the long-term, although the effect is partly realized in the short-term. Specifically, the production function of local public goods is modified as follows:

$$G_i = \tilde{A}\left[\frac{1}{d}\sum_{m=0}^{d-1} L_{i,0-m}\right]^{\lambda} {X_{G_i}}^{\gamma}$$

The current time is 0, m is the period, and $L_{i,m}$ is Region i's population at time m. Current TFP depends on the average population in the last d period. Owing to the model specification, the population is fixed across time, and the square brackets equal L_i.

When each local government cooperates at time 0, the production function of local public goods is as follows:

$$G_i = \tilde{A}\left[\frac{1}{d}\left\{\sum_{m=0}^{d-1} L_{i,0-m}\right\} + \frac{1}{d}L_{h,0}\right]^{\lambda} {X_{G_i}}^{\gamma}$$
$$= \tilde{A}\left[\frac{1}{d}\left\{\sum_{m=1}^{d-1} L_{i,0-m}\right\} + \frac{1}{d}\left\{L_{i,0} + L_{h,0}\right\}\right]^{\lambda} {X_{G_i}}^{\gamma}$$
$$= {A_i}' {X_{G_i}}^{\gamma}$$

$$i, h = (1, 2) \qquad i \neq h \qquad (11)$$

The current time is 0, m is the period, and $L_{i,m}$ is Region i's population at time m. Owing to the model specification, the population is fixed across time. Current TFP depends on the average population in the previous d period. When cooperation is realized at time 0, this population translates into the total population of both regions only at time 0. After cooperation, at time $d-1$, the cooperation effect is perfectly realized and the production function is the same as that in equation (6).

Second, the central government provides a transfer per capita s in each local government. Following Dur and Staal (2008), this paper ignores the national tax in the analysis, although the transfer is financed by means of this tax. Then, the budget constraint for Region i's local government is as follows:

$$t_i w_i L_i + sL_i = p_x X_{G_i} + cL_i$$

Considering these modifications, the local government's issue at the time when each local government accepts cooperation is as follows.

$$\max_{t_i} V_i = \left(\frac{\alpha}{p_x}\right)^{\alpha} \left(\frac{1-\alpha}{p_z}\right)^{1-\alpha} (1-t_i) w_i \left(\frac{t_i w_i L_i + sL_i - cL_1}{p_x}\right)^{\gamma} A_i'$$

Similar to the previous analysis, the tax rate and utility V_{1j}' are as follows:

$$t_i = \frac{\gamma + \frac{c-s}{w_i}}{\gamma + 1}$$

$$V_{ij}' = \left(\frac{\alpha}{p_x}\right)^{\alpha} \left(\frac{1-\alpha}{p_z}\right)^{1-\alpha} \frac{1 - \frac{c-s}{w_i}}{\gamma+1} {w_i}^{\gamma+1} {L_i}^{\gamma} \left[\frac{\gamma\left(1 - \frac{c-s}{w_i}\right)}{(\gamma+1)p_x}\right]^{\gamma} A_i'$$

Compared with the analysis in the previous section, it follows that the tax rate decreases in the transfer.

Next, we analyze whether each local government accepts cooperation. First, we analyze Region 1's local government. Similar to the previous section, the relative utility is as follows:

$$\frac{V_{1j}'}{V_1} = \left(1 - \frac{c-s}{w_1}\right)^{\gamma+1} \left(1 + \frac{1}{d}\frac{L_2}{L_1}\right)^{\lambda} \qquad (12)$$

When equation (12) is greater than 1, Region 1's local government wants to cooperate.

Before proceeding to the analysis, we make some assumptions. First, when $s = 0$

and $d = 1$, equation (12) is greater than 1. $s = 0$ and $d = 1$ indicate that the transfer does not exist, and the benefit of cooperation is realized immediately. In this case, we assume that Region 1's local government wants to cooperate (i.e., cooperation is desirable in the long-term). Second, we assume that the regional population differential is small and the relative population L_1/L_2 is fixed. From Proposition 1, the case exists in which each local government accepts cooperation. Third, the relative utility in Region 1 is greater than that in Region 2. Similar to the previous analysis, Region 2's relative utility when the manufacturing sector agglomerates in Region 1 is as follows:

$$\frac{V_{2j}'}{V_2} = \left(1 - (c - s)\right)^{\gamma+1} \left(\frac{\bar{L}}{L_2}\right)^{\lambda} \qquad (13)$$

where we set $s = 0$ and $d = 1$. The third assumption is that equation (12) >equation (13) when $s = 0$ and $d = 1$. This assumption is reasonable because the regional population differential is small, and the differential between each region's cooperation benefit is small. Based on this assumption, cooperation is realized if Region 2's local government accepts cooperation. Therefore, we analyze Region 2's local government.

We analyze the case in Region 2 and consider the case in which the manufacturing sector agglomerates in Region 1 and $w_2 = 1$. We assume that when $d = 1$ and $s = 0$, the relative utility is as follows:

$$\frac{V_{2j}{}'}{V_2} = (1-c)^{\gamma+1}\left(\frac{\bar{L}}{L_2}\right)^{\lambda} = 1 \qquad (14)$$

This means that Region 2 is indifferent to whether it accepts cooperation.

The objective of the transfer is to stimulate the local government's cooperation. The relative utility in Region 2 is as follows:

$$\frac{V_{2j}{}'}{V_2} = \big(1-(c-s)\big)^{\gamma+1}\left(1+\frac{1}{d}\frac{L_1}{L_2}\right)^{\lambda} \qquad (15)$$

Specifically, the central government sets s such that equation (15) = 1 when equation (15) <1, and $s = 0$. Then, the transfer s is as follows:

$$s = \left\{\frac{1}{\left(1+\frac{1}{d}\frac{L_1}{L_2}\right)^{\frac{\lambda}{\gamma+1}}} - 1\right\} + c \qquad (16)$$

Owing to equation (14), equation (16)>0 when $d > 1$. Therefore, the transfer is non-negative. Moreover, $s < c$ when $d > 1$, that is, the transfer is less than the per capita cooperation cost c.

Below, we analyze whether the total population stimulates transfer. We assume that the relative population L_1/L_2 is fixed; therefore, the effect of the total population on the transfer is as follows:

$$\frac{\partial s}{\partial \bar{L}} = 0$$

The transfer per capita does not change despite the total population increasing. If the population's economy of scale works, we expect that the benefit of cooperation will increase and the transfer will decrease. However, when the manufacturing sector agglomerates in Region 1, the benefit does not change for the total population. Therefore, the total population does not stimulate cooperation.

Next, we analyze whether the change in industrial distribution, in which the manufacturing sector is dispersed across regions, can stimulate cooperation. In the dispersed case, Region 2's wage increases and w_2 is given by equation (3). Then, the relative utility is as follows:

$$\frac{V_{2j}{}'}{V_2} = \left(1 - \frac{c - s}{w_2}\right)^{\gamma+1} \left(1 + \frac{1}{d}\frac{L_1}{L_2}\right)^{\lambda} \qquad (17)$$

Compared to the agglomerated case, the relative utility increases because of Region 2's wage. The central government sets s such that equation (17) =1 when equation (17) <1 and $s = 0$. Then, transfer s is as follows:

$$s = w_2 \left\{ \frac{1}{\left(1 + \frac{1}{d}\frac{L_1}{L_2}\right)^{\frac{\lambda}{\gamma+1}}} - 1 \right\} + c \qquad (18)$$

Compared with the agglomerated case, the transfer decreases because Region 2's wage increases, and the region can accept a larger transaction cost burden.

Similar to the agglomerated case, we analyze whether the total population stimulates cooperation. First, we analyze the effect on w_2. From equation (3), and assuming that L_1/L_2 is fixed, the following condition holds:

$$\frac{\partial w_2}{\partial \bar{L}} = \frac{1-\rho}{\rho}\frac{w_2}{\bar{L}} > 0 \qquad (19)$$

The wage increases in the total population. Then, the effect of the total population on the transfer is as follows:

$$\frac{\partial s}{\partial \bar{L}} = \left\{ \frac{1}{\left(1+\frac{1}{d}\frac{L_1}{L_2}\right)^{\frac{\lambda}{\gamma+1}}} - 1 \right\} \frac{1-\rho}{\rho}\frac{w_2}{\bar{L}} < 0 \qquad (20)$$

The transfer decreases with larger total population. In the dispersed case, the population's economy of scale decreases the transfer (i.e., it stimulates cooperation).

The effect on the aggregate transfer $s\bar{L}$ is as follows:

$$\frac{\partial (s\bar{L})}{\partial \bar{L}} = \frac{1}{\rho}[s-(1-\rho)c] \qquad (21)$$

Compared to the agglomerated case, the increment in aggregate transfer is small. Moreover, if $s < (1-\rho)c\bar{L}$, increasing the total population decreases the aggregate transfer. It is possible that if ρ is smaller, the scale economy of manufacturing production will be larger. Therefore, the larger total population should decrease the aggregate transfer if the economy of scale of manufacturing production is larger.

Summarizing these results, the following proposition holds:

Proposition 2

Consider that the benefit of cooperation takes time to be realized. Suppose that the regional population differential is small, and the relative population is fixed. Moreover, suppose that the larger population's region always wants to cooperate. Consider the lump-sum transfer in each region, and the objective is to motivate the smaller population's region to cooperate.

1. If the manufacturing sector agglomerates in the larger region, the aggregate transfer does not decrease, despite the total population of both regions increasing.

2. If the manufacturing sector is dispersed across regions, the transfer per capita

decreases in the larger total population. Moreover, if the economy of scale of manufacturing production is sufficient, increasing the total population will decrease the aggregate transfer.

The effect of the transfer that stimulates cooperation is greater if (i) the regional population differential is smaller, (ii) the smaller region's income is sufficiently larger, and (iii) the total population of both regions is larger. Increasing the total population stimulates the effect of cooperation, each region is expected to accept cooperation, and the transfer policy should work effectively. However, if the income in Region 2 is lower because of industrial agglomeration, the transfer policy will not work despite the total population increasing.

5 Conclusion

This paper analyzes how firm location, which determines wage differences among regions, affects the local governments' decisions regarding intermunicipal cooperation and the amount transferred to promote it. We analyze two regions, such as a city and suburb.

The results depend on the population and income determined by the firm's location. Only when regional population differential is small, all regions consent to intermunicipal cooperation. When the benefit of cooperation takes time to realize, the central government should make a transfer to each local government to promote intermunicipal cooperation. Then, the transfer amount decreases if the regional population differential is smaller, the smaller region's income is sufficiently larger through firm dispersion, and the total population of both regions is larger. Decreasing the transfer means that the effect of transfer is larger. Increasing that effect of transfers requires not only the regional population but also the regional income.

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