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Amalgamation, free-ride behavior, and regulation

Katsuyoshi Nakazawa*

Abstract

Amalgamation incentivizes municipalities to increase public debt because it allows them to subrogate their repayment and interest burden on the entire municipality after amalgamation. Especially, the smaller municipality tends to accumulate public debt in order to free-ride. Previous literature has shown this kind of opportunistic behavior in countries where municipalities can issue bonds freely in the market. However, public borrowing by municipalities is strongly controlled in Japan. This study examines the relationship between regulation of local government borrowing and the free-ride behavior of Japanese municipalities on amalgamation. Difference-in-difference regression confirms the free-ride effect, which is however wholly counterbalanced by regulation.

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1. Introduction

Many countries have implemented municipality amalgamation or boundary reform to create larger local governments in order to achieve economies of scale and scope. Against this background, a number of studies have attempted to verify the cost reduction effect of amalgamation (Bish, 2001; Byrnes and Dollery, 2002; Liner, 1992, 1994; Mehay, 1981; Reingewertz, 2012). However, except for Reingewertz (2012), these studies have found no evidence of economies of scale after amalgamation. Some papers cite opportunistic political behavior by the municipality before amalgamation as one of the reasons.

Amalgamation offers municipalities an incentive to accumulate public debt before amalgamation because the new municipality after amalgamation subrogates the load. This is a typical common-pool problem, first explored by Tullock (1959) and Buchanan and Tullock (1962): the overuse of fiscal resources. Weingast et al. (1981) formalized the incentive to free-ride. At the efficient spending level, the marginal social cost of a public-spending project in a certain district equals the marginal social benefit. However, if the costs of the project must be shared among n districts, only $1/n$ of the social marginal cost of the project should be loaded on a district¹. Therefore, when municipalities amalgamate, a small municipality tends to have a strong incentive to free-ride. Where N_i denotes the population of municipality i , which participates in an amalgamation, and N_j the total population of the post-amalgamation municipality, including municipality i , the social marginal borrowing cost of municipality i is equal to $N_i/N_j < 1$. Hinnerich (2009) formulates the strength of municipality i 's incentive to free-ride as $Freeride_i = 1 - N_i/N_j \in [0,1]$.

Hinnerich (2009) and Jordahl and Liang (2010) found that smaller local governments tend to accumulate public debt in order to free-ride on the increased number of taxpayers in the new, expanded municipal entity. Hinnerich (2009) focuses on the Swedish boundary reform from 1969 to 1974. Jordahl and Liang (2010) explore the first wave of the Swedish boundary reform in 1952. These studies use difference-in-difference (DID) estimation to clarify municipalities' free-ride behavior before amalgamation.

Whether the above studies' findings on amalgamation apply to other countries as well is an important question. Japan witnessed a large wave of municipality amalgamations after 1999. It would be interesting to consider how Japan's local finance system, especially regulation of local government borrowing, affects free-ride behavior.

¹ Baqir (2002), Bradbury and Crain (2001), Bradbury and Stephenson (2003), and Gilligan and Matsusaka (1995, 2001) have empirically analyzed the $1/n$ effect.

Regulation of local public borrowing in Japan is quite different from the Swedish case. In Sweden, local governments can freely issue and manage public bonds with no central government supervision (Ter-Minassian, 1997). However, in Japan, public bond issues by the local government are strongly managed by the central government. Local governments require permission from the upper-level government before issuing bonds.² Moreover, local public bond issues are managed by an index of public debt balances called “debt expenditure ratio.” When this ratio exceeds a constant value, restrictions are imposed on flotation of loans, and improvement programs are initiated by the local government. Regulation on the flotation of loans likely controls the free-ride behavior before amalgamation. This study examines how the regulation of local government borrowing influences the free-ride behavior of Japanese municipalities.

The remainder of this paper is organized as follows. Section 2 discusses the background of municipal amalgamation and local government borrowing regulation in Japan. Section 3 presents the empirical method and the data used. Section 4 describes the difference-in-difference regression carried out, using municipal data to examine the relationship between regulation of local government borrowing and free-ride behavior. Section 5 concludes the paper.

2. Municipality amalgamation and regulation of local public bond issues in Japan

The Japanese government enacted the Municipal Amalgamation Law (the old law, henceforth) in 1965 to promote amalgamation. The old law included several measures to promote amalgamation, such as guaranteeing the merged municipality the same amount of inter-governmental subsidy (local allocation tax grant; LAT)³ as before the amalgamation for 10 years. However, although the old law was revised every 10 years until the 1990s, voluntary amalgamation was not an option, and thus the number of municipalities decreased by only 163 from 1965 to 1999.

This situation changed significantly in the latter half of the 1990s when the Japanese government reviewed the roles of the central, prefectural, and municipal governments. In 1999, the old law was amended to conform to the provisions of the Omnibus Law of Decentralization, including additional measures that supported municipality amalgamation through financial provisions. As a result, the number of Japanese municipalities almost halved, from 3,229 to 1,719, between April 1999 and

² “Permission from the upper-level government” was replaced by “consultation with upper-level government” as the condition for public bond issues by municipalities since fiscal year 2006.

³ LAT is the inter-governmental subsidy that aims to adjust the uneven distribution of central government resources between local governments.

January 2012. However, municipalities opted for amalgamation on a large scale only until the end of fiscal year (FY henceforth) 2005 because the financial support provided by the national government for amalgamation was revised under the new law in FY 2006. Figure 1 shows the number of municipalities that participated in amalgamation from FY 1999 to FY 2005.

[Figure 1 around here]

The old law provided for various types of financial support for amalgamation. First, the guaranteed period for receiving the same amount of LAT was extended to 15 years after amalgamation. Second, the law allowed amalgamated municipalities to issue special-purpose municipal bonds to finance up to 95% of the amalgamation cost (e.g., construction) for 10 years after amalgamation. Moreover, the central government covered 70% of the principal and interest payments under the bonds by LAT.⁴ These municipal support measures related to the post-amalgamation period. However, amalgamation promotion bonds provided financial support to municipalities before amalgamation. Bond issues were allowed up to 90% of the amalgamation cost, and the central government covered 50% of the principal and interest payments under the bonds by LAT. Amalgamation promotion bond issues were allowed from FY 2002 to FY 2004.

As stated in the Introduction, public bond issues by Japanese local governments are subject to strict central government regulation. The local government needs to obtain permission from the prefectural governor or the Minister for Internal Affairs and Communications, before issuing bonds. In addition, the debt expenditure ratio controls the level of local public debt. This is the ratio of public debt to the scale of government finance of the municipality. When this ratio exceeds 15%, the municipality is required to start a financial improvement program and reduce the ratio to 13% within 7 fiscal years. When this ratio exceeds 20%, public bond issues by the municipality are severely curbed. These restrictions on local public bond issues might limit free-ride behavior on amalgamation.

3. Empirical framework and data

I use the same empirical framework as Hinnerich (2009) did. In this section, I describe an empirical model based on the difference-in-difference approach. The data

⁴ Special-purpose municipal amalgamation bonds were abolished by the new law after FY 2006.

used for the analysis are then described.

Hinnerich (2009) found that municipalities with a lower population before than after amalgamation tend to have a strong incentive to free-ride. Municipality i has an incentive to free-ride whose strength is equal to $Freeride_i = 1 - N_i/N_j \in [0,1]$. This yields the following relation:

$$Debt_i = \alpha + \beta Freeride_i + u_i, \quad (1)$$

where u_i represents the observed or unobserved local public debt determinates. The parameter β signifies the free-ride effect. The old law was revised in FY 1999 and withdrawn in FY 2005. Therefore, I could observe the whole period of Japanese municipality amalgamation using the DID approach. I used data before municipality amalgamation began (i.e., FY 1998).

$$\Delta Debt_i = \theta + \beta \Delta Freeride_i + v_i, \quad (2)$$

where Δ indicates the difference operator, representing the difference between FY 1998 and one fiscal year before amalgamation and $\Delta Debt_i$ indicates the change in local public debt between FY 1998 and FY 2004 for the control group (i.e., municipalities that have never amalgamated) and municipalities that amalgamated in FY 2005. As shown in Figure 1, municipality amalgamation in Japan continued for a certain period. To control for differences due to the fiscal year of amalgamation, the fiscal year dummy is multiplied by $Freeride$. I employ amalgamation dummies for FY 2003 and FY 2004 because only a few municipalities amalgamated from FY1999 to FY2002. Changes in the level of public debt between FY 1998 and FY 2002 are calculated for municipalities that amalgamated in FY 2003 and between FY 1998 and FY 2003 for municipalities that amalgamated in FY 2004. $\Delta Freeride = Freeride$. Thus, eq. (2) can be written as

$$\Delta Debt_i = \theta + \beta_1 Freeride_i + \beta_2 Freeride_i \times YD_{2004,i} + \beta_3 Freeride_i \times YD_{2003,i} + v_i, \quad (3)$$

where YD_i indicates the amalgamation year dummy.

This paper aims to examine the relationship between free-ride behavior and registrations on local public bond issues. Therefore, I employ two dummy variables that take 1 when the debt expenditure ratio is 10% to less than 15% ($DER_{10-15,i}$) as well as more than 15% ($DER_{over15,i}$). Thus, eq. (3) can be written as

$$\Delta Debt_i = \theta + \beta_1 Freeride_i + \beta_2 Freeride_i \times YD_{2004,i} + \beta_3 Freeride_i \times YD_{2003,i} + DER_{10-15,i} + DER_{over15,i} + v_i, \quad (4)$$

where the data for these dummy variables relate to FY 1998. Other pre-treatment control variables for municipality characteristic are population, area, ratio indicating financial resilience and soundness, percentage in agriculture population, percentage in manufacturing population, percentage in elderly population, and local public debt per capita. See the appendix for a more detailed description of data sources and definitions. Table 1 shows data on the above variables for the 3,157 municipalities, including 1,943 merged municipalities. The data sources are shown in the appendix. Debt per capita and changes in debt per capita are expressed in units of 1,000 JPY. The data for control variables relate to FY 1998, one fiscal year before amalgamations started. However, for variables such as area, percentage in agriculture, percentage in manufacturing, percentage of elderly population I used 1995 data from the national census, carried out every five years in Japan.

[Table 1 around here]

The average debt per capita in FY 1998 was 684,640 JPY. The change in debt per capita averaged 97,160 JPY, 113,440 JPY, and 90,820 JPY for municipalities that amalgamated in 2003, 2004, and 2005, respectively. The change in debt per capita for municipalities that have never amalgamated averaged 55,270 JPY. The average change in debt per capita is larger for municipalities that amalgamated compared to those that did not. Figure 2 helps the reader to visually understand these changes.

[Figure 2 around here]

Figure 2 shows the change in debt per capita for each group. The vertical axis represents the amount of debt per capita in units of 1,000 JPY. The horizontal axis shows fiscal years. Municipal debt increases one year before amalgamation. However, all groups show parallel trends before the reform (i.e., FY 1999). Figure 2 helps identify parallel trends that emerge from the DID method.

4. Empirical results

I use eq. (4) as the baseline specification. The regression results are shown in Table 2.

[Table 2 around here]

All estimation results on *Freeride* are significantly positive, showing that smaller municipalities to the post-amalgamation municipality have an incentive to increase public debt before amalgamation. However, this effect is not very strong in spite of the amalgamation promotion bond facility. From the estimation result of estimation 4, the free-ride effect is equal to 32,915 JPY, approximately 5% of the average local public debt per capita. Hinnerich (2009) shows that the free-ride incentive has a strong effect on public debt, leading to a 25% increase over the average debt before reform. Thus, the possibility that regulation of local public bond issues controls free-ride behavior in Japan does exist.

The DER dummies, the proxies for local public borrowing regulation, are all significantly negative relative to the change in debt. In particular, $DER_{10-15\%}$ and $DER_{over15\%}$ are equal to -62.478 and -232.808, respectively, while *Freeride* is estimated at 32.915. Therefore, when a municipality's debt expenditure ratio exceeds 10%, the free-ride effect of the municipality is wholly counterbalanced because $Freeride > 1$. Thus, regulation on issue of local public bonds clearly controls free-ride behavior.

The above results might have other implications as well. For example, the free-ride effect has the potential to neutralize the entire effect of municipality amalgamation. Therefore, I change *Freeride* into an amalgamation dummy that takes 1 when a municipality is amalgamated. The results are shown in Table 3. The amalgamation dummy results are significantly positive for all regressions. However, the coefficients of amalgamation dummy are lower than the results of *Freeride*. Therefore, a smaller municipality has a greater incentive to increase debt compared to a large municipality, but its effect might not be very strong. Thus, regulation on local public bond issues clearly controls the effect of increasing debt before amalgamation.

[Table 3 around here]

In addition, I use other regressions for different specifications. The sample is grouped by fiscal year of amalgamation. Therefore, the change in debt per capita for the control group is adjusted to the fiscal year of amalgamation. The results are shown in Table 4. The regression results are the same as in Table 2. All estimation results of *Freeride* are significantly positive, and the *DER* dummies are significantly negative relative to the change in debt.

[Table 4 around here]

The free-ride incentive is positive, but regulation on local public bond issues controls the incentive at a constant level throughout the regressions.

5. Conclusion

Amalgamation offers municipalities an incentive to increase local public debt because they can subrogate their repayment and interest burden on the entire municipality after amalgamation. Previous studies have clearly confirmed free-ride effects in countries where local governments could freely issue bonds in the market. However, the local finance system in Japan, specifically regulation of local public borrowing, may exercise control over free-ride behavior. This paper examines the relationship between regulation of local public borrowing and free-ride behavior associated with Japanese municipality amalgamation.

I employed a difference-in-difference approach, the results of which clearly show the opportunistic behavior of municipalities before amalgamation. The evaluated mean free-ride effect is around 32,915 JPY, which is approximately 5% of the average local public debt per capita. However, this percentage is far lower than in previous studies. Moreover, the DER dummies, the proxies for local public borrowing regulation, are all significantly negative relative to a change in debt. Thus, the free-ride effect is wholly counterbalanced by regulation. Regulation of local public borrowing controls the opportunistic behavior at a constant level. However, this regulation is not able to control the opportunistic behavior, because it functions as a price cap. The findings of this study might provide useful insights to policy makers to design an ideal system of financial decision making by the local government.

Appendix. Statistical sources and definition of variables

Free-ride is defined as $1 - N_i/N_j \in [0,1]$, where N_i is the population of municipality i , which participates in an amalgamation, and N_j is the total population of the post-amalgamation municipality, including municipality i . Source: Statistics Bureau, Ministry of Internal Affairs and Communications 1998.

Change in local public debt per capita is considered in three settings: per capita debt in FY 2002 minus the debt level in FY 1998 (merged in FY 2003), per capita debt in FY 2003 minus the debt level in FY 1998 (merged in FY 2004), and per capita debt in FY 2004 minus the debt level in FY 1998 (merged in FY 2005, never merged). Source: Local

Government Finance Settlement FY 1998, FY 2002, FY 2003, and FY 2004.

Debt per capita 1998 is the per capita local public debt. Source: Local Government Finance Settlement 1998.

Population is the municipality's population (unit: 1,000 people) in FY 1998. Source: Statistics Bureau, Ministry of Internal Affairs and Communications 1998.

Area is the area of a municipality (unit: km²). Source: The National Census 1995.

Percentage in agriculture population is the percentage of population working in agriculture and similar sectors. Source: The National Census 1995.

Percentage in manufacturing population is the percentage of population working in manufacturing and similar sectors. Source: The National Census 1995.

Ratio indicating financial resilience and soundness is the ratio of fixed expenditure (i.e., labor cost, repayment cost of local public debt, etc.) to fiscal resources that the municipality can freely use. A high ratio is considered to indicate financial stringency. Source: Local Government Finance Settlement 1998.

Percentage in elderly population is the size of the elderly (aged 65 or older) population expressed as a percentage of the total population. Source: The National Census 1995.

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Figure 1. Municipality amalgamation over the years

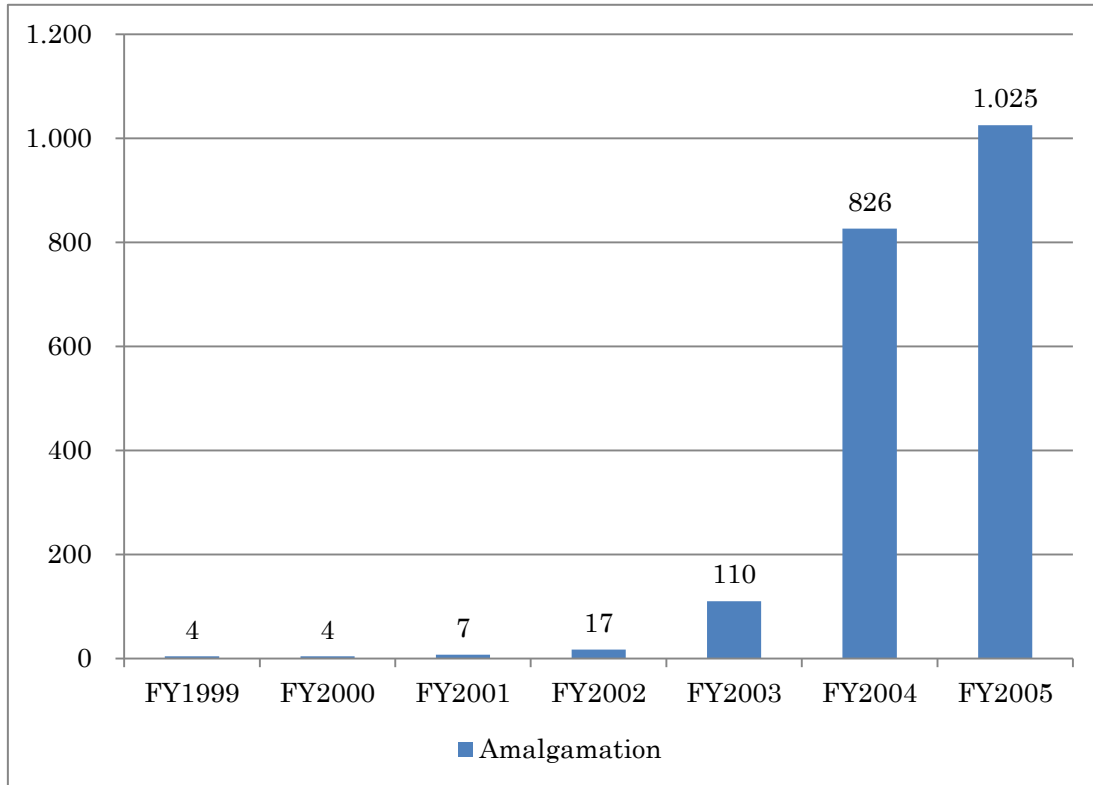


Table 1. Summary statistics

Variables	N	Mean	S.D.	Min	Max
Debt per capita in 1998	3157	684.64	623.25	59.03	61.42
Change in debt per capita, 1998-2002 (merged in 2003)	108	97.16	313.91	-785.42	2777.30
Change in debt per capita, 1998-2003 (merged in 2004)	820	113.44	230.69	-839.51	2446.37
Change in debt per capita, 1998-2004 (merged in 2005)	1015	90.82	244.07	-975.02	3490.31
Change in debt per capita, 1998-2004 (never merged)	1214	55.27	197.75	-1308.93	1292.96
Freeride	3157	0.44	0.41	0.00	0.99
Debt expenditure ratio dummy (10-15%)	3157	0.46	0.49	0.00	1.00
Debt expenditure ratio dummy (over 15%)	3157	0.03	0.16	0.00	1.00
Population	3157	36,098.16	122,274.20	204.00	3,351,612.00
Area (km ²)	3157	115.19	135.33	1.27	1,408.10
Percentage in agriculture	3157	15.69	11.37	0.10	78.08
Percentage in manufacturing	3157	32.67	8.83	1.42	61.42
Ratio indicating financial resilience and soundness	3157	81.64	7.32	35.00	137.10
Percentage of elderly population	3157	22.76	6.84	6.84	49.32

Figure 2. Change in average debt per capita

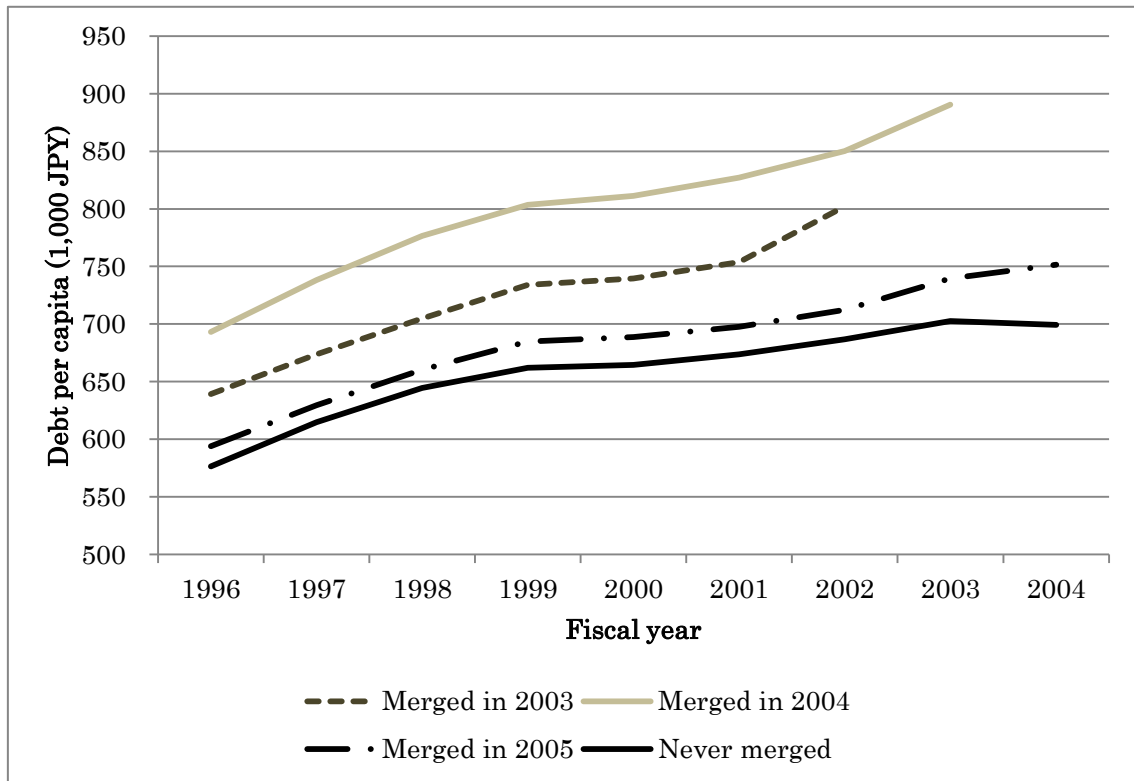


Table 2. Effects of incentive to free-ride and local public debt regulation on change in debt

Variables of interest	Estimation 1		Estimation 2		Estimation 3		Estimation 4	
<i>Freeride</i>	63.951	*** (13.96)	60.267	*** (13.61)	36.471	** (14.44)	32.915	** (14.12)
<i>Freeride</i> × <i>dummy if merged in FY 2003</i>	10.072	(52.95)	7.794	(52.75)	-4.394	(53.19)	1.122	(52.76)
<i>Freeride</i> × <i>dummy if merged in FY 2004</i>	27.128	(16.73)	31.016	* (16.42)	16.126	(16.62)	18.604	(16.26)
<i>DER dummy (10-15%)</i>			-53.869	*** (7.86)			-62.478	*** (9.18)
<i>DER dummy (over 15%)</i>			-209.738	*** (26.87)			-232.808	*** (29.38)
<i>Controls</i>	No		No		Yes		Yes	
<i>Number of observations</i>	3157		3157		3157		3157	
<i>R</i> ²	0.020		0.051		0.066		0.098	

Notes: ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

Robust standard errors are shown in parentheses.

Pre-treatment controls: population, area, ratio that indicates financial resilience and soundness, percentage in agriculture population, percentage in manufacturing population, percentage in elderly population, and local public debt per capita.

Table 3. Regression results based on amalgamation dummy

Variables of interest	Estimation 5		Estimation 6		Estimation 7		Estimation 8	
<i>Amalgamation dummy</i>	35.549	*** (9.54)	36.109	*** (9.38)	16.846	* (9.46)	18.710	** (9.35)
<i>Amalgamation dummy if merged in FY 2003</i>	6.348	(31.05)	2.500	(30.83)	-5.697	(30.98)	-2.891	(30.65)
<i>Amalgamation dummy if merged in FY 2004</i>	22.626	** (11.12)	25.405	** (10.92)	11.498	(11.09)	13.678	(10.87)
<i>DER dummy (10-15%)</i>			-56.703	*** (7.97)			-63.715	*** (9.23)
<i>DER dummy (over 15%)</i>			-212.087	*** (26.87)			-235.975	*** (29.42)
<i>Controls</i>	No		No		Yes		Yes	
<i>Number of observations</i>	3157		3157		3157		3157	
<i>R²</i>	0.011		0.043		0.064		0.096	

Notes: ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

Robust standard errors are shown in parentheses.

Pre-treatment controls: population, area, ratio that indicates financial resilience and soundness, percentage in agriculture population, percentage in manufacturing population, percentage in elderly population, and local public debt per capita.

Table 4. The effects of the incentive to free-ride and regulation to issue local public debt on change in debt, amalgamation year basis

Variables of interest	Estimation 9						Estimation 10					
	2003		2004		2005		2003		2004		2005	
<i>Freeride</i>	75.389 ***	(24.65)	84.227 ***	(13.74)	58.128 ***	(13.76)	57.021 **	(24.85)	42.637 ***	(14.51)	35.332 **	(14.17)
<i>DER dummy (10-15%)</i>	-35.319 ***	(10.32)	-51.302 ***	(9.09)	-48.354 ***	(8.99)	-39.992 ***	(11.11)	-57.923 ***	(10.22)	-56.580 ***	(10.22)
<i>DER dummy (over 15%)</i>	-150.111 ***	(32.47)	-164.091 ***	(28.41)	-225.788 ***	(35.41)	-185.789 ***	(34.60)	-205.821 ***	(33.74)	-227.861 ***	(34.45)
<i>Controls</i>	No		No		No		Yes		Yes		Yes	
<i>Number of observations</i>	1325		2037		2232		1235		2037		2232	
<i>R²</i>	0.026		0.052		0.046		0.071		0.119		0.088	

Notes: ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

Robust standard errors are shown in parentheses.

Pre-treatment controls: population, area, ratio that indicates financial resilience and soundness, percentage in agriculture population, percentage in manufacturing population, percentage in elderly population, and local public debt per capita.