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Abstract

This study examines the effects of central matching grants for the School Expense Assistance (SEA) in the midst of increasing child poverty in Japan. The 2005 reform replaced SEA grants with increases in general revenues through the system of Local Allocation Tax (LAT). By exploiting the facts that the replaced grants were closed-ended and that LAT disbursements were not made to every locality, we could not only identify the effects of the matching grants but also decompose the effects into price and income effects. We show that the 2005 change indeed suppressed SEA expenditures. The loss of matching grants reduced per-recipient SEA benefits by about JPN¥5,000 (US$56) for first-year elementary school students and JPN¥12,000 (US$133) for first-year junior high school students. The loss also reduced recipient percentage among students by 1.2–2.1 percentage points from 11.52 percent in 2004, although the eligibility criteria were barely affected.

Key Words: school expense assistance, fiscal transfers, difference-in-differences, Japan
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1. Introduction

Estimation of the effects of central grants on local expenditures has been studied extensively. The effects of transfers are associated with changes in the matching rate of categorical grants (price effects) and in the amount of lump-sum general grants (income effects). However, identifying those effects has been a major challenge. Typically, matching rates are nationally uniform, with no cross-sectional variations (Baker et al. 1998). They occasionally change to yield time-series variations, but they are usually contaminated with aggregate shocks that are difficult to identify, as seen in the US debate on caseload changes (Blank 2001). On the other hand, the amount of general grants often has both cross-sectional and time-series variations. But their disbursements could become endogenous, since they could be simultaneous with local expenditures (Chernick 1979) or they may be correlated with unobserved factors that affect local expenditures (Holtz-Eakin 1986).

To cope with these difficulties, previous studies have taken advantage of specific institutional changes or aspects in different countries to identify the effects of central grants on local behavior. For example, many US studies examined the effects of federal grants on state expenditures for social assistance programs, as surveyed by Chernick (1998). Several studies among them took advantage of the replacement of the Aid to Families with Dependent Children (AFDC) with Temporary Assistance to Needy Families (TANF). Among non-US studies, Baker et al. (1998) investigated the Canadian reform in 1990 when federal grants for provincial welfare expenditures were converted from open-ended matching to closed-ended. Focusing on effects on municipal taxes, not expenditures, Buettner (2006) exploited discontinuities and changes in the mechanism of fiscal equalization in Baden-Württemberg, Germany. Dahlberg et al. (2008) also made use of a discontinuity in the grant system in Sweden to examine its effects on local spending and tax rates.

This study contributes to the literature by examining another instance of institutional change — School Expense Assistance (SEA) programs in Japan. SEA programs are national programs implemented by municipalities (cities, towns, and villages) to help children in low-income households attend primary and junior high school by providing cash for school supplies and related necessities. The program

covers families with children who receive public assistance benefits (Category I) or *marginally* fail to qualify for public assistance[1] (Category II).[2] Although the national government sets eligibility criteria for Category I recipients, municipalities have discretion over eligibility criteria for Category II recipients, which comprised 90.4 percent of SEA recipients in 2007. In addition, they have discretion over benefit levels that apply to both types of recipients. In other words, SEA benefits are identical within a municipality but different across municipalities.

The institutional change we consider is the reform of central grants in 2005. The reform replaced a number of matching categorical grants with increases in local general revenues. SEA grants were no exception. SEA benefits had been subsidized with 50 percent matching rate both for Category I and II recipients before 2005. But the reform abolished the matching grant for Category II, and the resultant local losses were compensated with an increase in general grants. There are two key points. First, the matching grants were closed-ended (i.e., capped). Municipalities with uncapped receipts of SEA grants thus faced a 50 percent matching rate, whereas those with capped receipts did not. Second, the compensations were made through the system of Local Allocation Taxes (LAT). Thus, only LAT recipients were compensated and non-recipients were not. These differences in the reception status may allow us not only to identify the effects of central grants but also to decompose them into price and income effects.

Although many local programs are centrally controlled in Japan, the SEA is one of few national programs over which municipalities have a large degree of discretion. National law mandates only that municipalities provide financial support to needy children so that they can complete compulsory education. But it specifies nothing more, making the case relevant for other countries in which localities have discretion over their programs. Despite this local discretion, SEA grants effectively worked as a standardizing factor across municipal programs, because the central government

[1] Here, the term "public assistance" is used to refer to a *single* system of needs-based and tax-financed social programs called *Seikatsu Hogo* that aim to guarantee the minimum costs of living in Japan. The Japanese phrase literally means "the protection (*hogo*) of daily life (*seikatsu*)."

[2] The tags "Category I" and "Category II" are for the convenience to express them in English for this study. Officially, the former is referred to as "*yohogosha*," which literally means "members of households protected by public assistance." The latter is called "*jun-yohogosha*," which means "members of households at the margins of being eligible for being protected by public assistance."

specified a number of conditions for municipalities to receive SEA grants. The 2005 reform abolished such a standardizing factor for the Category II recipients and replaced the categorical grants with an increase in general grants in the name of decentralization.

However, such "decentralization" was implemented in the midst of increasing child poverty. The poverty rate in Japan is now the fourth highest among OECD countries after Turkey, Mexico, and the United Sates (OECD 2008). Japan's child poverty has also reached a high level: one in seven children lives in relative poverty (Abe 2008). This has apparently resulted in a surge in the number of SEA recipients, whose percentage among pupils has more than doubled from 6.6 percent in 1997 to 13.4 percent in 2008. Despite this increasing poverty, it is argued, the 2005 reform made it more difficult for municipalities to implement SEA programs and to provide proper assistance for children in need (Gan 2009). Our study is the first to substantiate some of the claimed effects of the 2005 reform. We will show that the 2005 reform indeed suppressed SEA expenditures in the midst of increasing child poverty in Japan, although such effects apply only to municipalities that had their SEA grants uncapped.

The rest of the paper is organized as follows. Section 2 introduces the Japanese system of school expense assistance and intergovernmental transfers, and describes our identification strategies. Section 3 takes a preliminary look at our data and describes how our estimation proceeds. Section 4 performs a set of estimations and discusses the results. Section 5 concludes the paper.

2. Institutional Backgrounds and Identification Strategy

2.1. School expense assistance

Compulsory education in Japan consists of six years of elementary school and three years of junior high school, starting at age seven. Public elementary and junior high schools are tuition-free, and textbooks are free. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) reports that annual costs of compulsory education per student in 2007 averaged about JPN¥100,000 (US$1,100) for

elementary school and JPN¥170,000 (US$1,900) for junior high school, including expenses for school lunches, commuting, uniforms, supplies, excursions, and extracurricular activities. The School Expense Assistance (SEA) aims to provide cash benefits to low-income households having difficulty affording educational expenses. Targeted recipients are pupils attending pubic primary and junior high schools who live in households that receive public assistance (Category I) or *marginally* fail to qualify for public assistance benefits (Category II).

National law mandates that municipalities (cities, towns, and villages) implement SEA programs.[3] Although eligibility criteria for Category I recipients are determined by the central government, municipalities have large discretion in implementing SEA programs. Chapter 19 of the School Education Act mandates only that municipalities provide financial support to needy children attending compulsory educational institutions, but it does not specify eligibility criteria, assessment procedures, expenses to be covered, benefit levels, and management structures. The only standardization was that the SEA had specified conditions for municipalities to follow when they received funds as grants. However, the 2005 reform abolished even this minimal standardization for Category II recipients, which comprise more than 90 percent of recipients.

For example, there are large variations in eligibility criteria and benefit levels (Yuda 2009). Benefits are disbursed to households whose income exceeds a threshold; the threshold can be a multiple of the minimum cost of living set by the central government for public assistance. These multiples vary from 1.0 to more than 1.5, indicating a more than 50% difference between the least and most generous municipalities. Benefit levels also vary. Although there are no benefit differences between Category I and Category II *within* municipalities, benefit differences *across* municipalities are large, ranging from JPN¥2,000 to JPN¥796,000 per recipient in 2007 for the first year of elementary school (Yuda 2009).

[3] There are two levels of government in Japan, with municipalities (cities, towns, and villages) as the first tier, and prefectures as the second tier. Tokyo as the national capital contains 23 special districts (*ku*) and regular municipalities, and provides specific types of municipal services for residents within the special districts. The special districts take on residual municipal services.

2.2. System of intergovernmental transfers and its changes in 2005

There are two main types of fiscal transfers to local governments in Japan: the Central Government Subsidy (CGS) and the Local Allocation Tax (LAT).[4] The CGS refers to a set of categorical grants disbursed directly from budgets of central line-ministries. Until 2004, the CGS for the SEA programs was disbursed from the budget of MEXT and was 50 percent of the SEA benefits. However, the matching grants were closed-ended. Municipalities thus bore 50 percent of the SEA benefits when the grants were uncapped, and they bore more than 50 percent of the SEA benefits when the grants were capped.

However, such local burden of up to 50 percent of the capping expenditure was taken care of by the LAT for fiscally "weak" localities. The LAT is a general-purpose grant, financed from a set of national taxes along with other central revenue sources. The amount of LAT disbursed to a locality is the non-negative difference between its Standard Fiscal Demand (SFD) and Standard Fiscal Revenues (SFR). Therefore, a locality receives the LAT disbursement when its SFD exceeds its SFR. The SFD is an estimate of the local expenditures required to maintain a standard quality of public services within a locality, while the SFR is an estimate of local fiscal capacity, consisting of a fixed portion of estimated local tax revenues plus assorted transfers. The key is that the SFD includes the local burden of SEA programs.

Reform of central grants in 2005 abolished the CGS for SEA benefits for Category II recipients. Accordingly, the local burden for SEA programs increased. Losses are supposed to be compensated through an increase in LAT grants with an increase in SFD equivalent to 50 percent of the capped amount of SEA grants. However, if a municipality is not an LAT recipient (i.e., its SFD does not exceed its SFR), an increase in SFD does not lead to an increase in LAT grants. In other words, losses caused by abolishing SEA grants were compensated only in LAT-receiving municipalities.

2.3. Identification strategy

Effects of the 2005 reform on municipal implementation of SEA programs vary

[4] The LAT consists of the Ordinary Local Allocation Tax (OLAT) and the Special Local Allocation Tax (SLAT). What we call LAT here is in fact the OLAT, which shares 94% of the total LAT disbursements. The remaining part is disbursed as the SLAT against fiscal shocks unaccounted for by the OLAT.

depending on variables examined. In the discussion presented in this section, we consider per-recipient SEA expenditure before and after the 2005 reform. We will also consider other relevant variables in empirical analysis in subsequent sections.

Figure 1 shows SEA expenditures and other expenditures on the horizontal and vertical axis, respectively, in per-recipient terms. Before the 2005 reform, the SEA grant expanded the original budget line AB to kinked line ACB'. The kink at C is due to the cap on the grant, which equals the vertical distance CE at expenditure level F. Note that segment CB' runs parallel to the original line AB. Therefore, if grants are disbursed for expenditures more than F, they are in effect lump-sum.

First consider a municipality that spent more than F at a before the reform. If an increase in SFD *exactly* compensates the capped amount CE, its budget line moves to $A'B'$, which includes segment CB' after the reform. The LAT recipient's choice is thus kept unchanged at a. On the other hand, since the reform simply takes away lump-sum transfer CE without compensation for a non-LAT recipient, its budget line ACB' moves back to the original budget AB. Figure 1 shows the newly chosen point at b. The movement from a to b indicates the income effect caused by the policy change.

Next consider a municipality that spent less than F at c before the reform. This municipality faced a 50 percent matching rate as its SEA grants were not capped with the SEA expenditures below F. After the reform, if the LAT compensations equal to CE, segment AC rotates clockwise at C to segment $A'C$ and coincides with a straight line $A'B'$ for LAT recipients. The figure depicts that a LAT recipient chooses at e. The move from c to e reflects changes in both price (the abolishment of the matching rate) and income (an increase in the LAT grants by CE). On the other hand, the reform moves its budget line inward to the original line AB for a non-LAT recipient who chooses, say, point d.

Figure 1

We utilize two dummy variables, D and W, to identify the effects just described. The first variable is equal to unity ($D = 1$) if municipalities had received an uncapped amount of SEA grants before the 2005 reform and is zero ($D = 0$) otherwise. As such, this is also a dummy variable for municipalities that had spent less than F. It then compares municipalities that suffered a reduction in the matching rate from 50

percent to zero against those that experienced no change in the relative price of SEA expenditure. It then captures the price effect caused by the loss of the matching component of the SEA grants, associated with the movement from *c* to *d* in Figure 1.

The second variable is meant to capture the *negative* of the income effect on the SEA expenditure that the LAT compensation causes, since it is equal to unity ($W = 1$) if municipalities receive no LAT grants after reform and is zero ($W = 0$) otherwise. With the exact compensation *CE*, the budget line moves from *AB* to *A'B'*, causing the income effect that relocates choices from *b* to *a* or *d* to *e*. The opposite movements ($a \rightarrow b$ or $e \rightarrow d$) are captured by *W*, since it picks up the effects on non-LAT recipients whose budget line shifts inward. This then shows the effects caused by the loss of the lump-sum component of the SEA grants.

The above discussion would allow us to exploit the following regression model to obtain the difference-in-differences (DD) estimator using data before and after the 2005 grant reform:

$$\Delta y_i = \alpha + \beta \cdot D_i + \gamma \cdot W_i + \varepsilon_i \qquad (1)$$

where subscript i indexes municipalities, $\Delta y_i = y_{i2007} - y_{i2004}$ is the difference in per-recipient SEA benefits before and after the reform (we employ 2004 and 2007 data), and Greek letters are the parameters to be estimated.

However, the preceding identification of the income effect is predicated on the assumption that compensation through LAT was *exactly* equal to the capped amount of SEA grants (i.e., *CE* in Figure 1). Although the central government may claim that the compensation would be almost equal to *CE* on average, municipalities argue that it was less than they had expected (Gan 2009, Yuda 2009). Figure 2 illustrates the case where the LAT compensates less than the capped amount of SEA grants, *CE*. The figure adds new budget line *A"B"* for LAT recipients and corresponding chosen points (*a'*, *e'*) after the reform, retaining the budget lines (dotted line *A'B'*) and chosen points (*a*, *e*) for the exact compensation case. In this case, *W* does not identify movements $b \rightarrow a$ or $d \rightarrow e$, but movements $b \rightarrow a'$ or $d \rightarrow e'$. As such, *W* still indicates the income effect from the loss of LAT compensation, although we cannot associate it with the income effect the SEA grants had exerted before 2005. It should be stressed, however, that *D* still identifies the price effect by the change in the matching rate of

SEA grants.

Figures 2 and 3

Finally, since the budget line was kinked at C before the 2005 reform, it is possible that municipalities had made their choice at the kink point. Figure 3 illustrates this possibility. Although municipalities may not respond to an infinitesimal change in the matching rate, they should respond to a change in the rate from 0.5 to zero. First, if the LAT compensates exactly the loss of the capped amount of SEA grants, CE, LAT recipients choose at f after the reform. Even if the compensation is partial, the choice is now at f'. On the other hand, non-LAT recipients who chose at C choose at g after the reform. As we will see, variable W may also pick up municipalities that made their choice at the kink point, as Figure 3 illustrates.

3. Empirical Implementation

3.1. Regression models

The actual model we utilize is the DD regression with additional regressors:

$$\Delta y_i = \alpha + \beta \cdot D_i + \gamma \cdot W_i + \sum_k \phi_k \cdot \Delta X_{k.i} + \varepsilon_i \qquad (2)$$

where differenced controls $\Delta X_{it} = X_{ki2007} - X_{k,i2004}$ intend to control elements in error terms that affect SEA benefits and correlate with the dummy variables. Note that (2) can be seen as a differenced version of the following linear response model:

$$y_{it} = \alpha \cdot t + \theta \cdot P_{it} + \lambda \cdot M_{it} + \sum_k \phi_k \cdot X_{k.it} + h_i + u_{it} \qquad (3)$$

where P_{it} is the "price" of SEA benefits, M_{it} is the amount of general transfers including LAT grants, h_i is unobserved heterogeneity, and u_{it} is the error term with $\varepsilon_i \equiv \Delta u_i$. Unobserved heterogeneity h_i would work as a preference shifter that, along with other controls, locates the choice of localities in Figures 1, 2, or 3.

When we difference (3) over two periods that straddle year 2005 as we do for 2007 and 2004, we can make the following observations for (2). First, $\beta \cdot D_i = \theta \cdot D_i \Delta P_i = \theta/2 \cdot D_i$ so that $\beta = \theta/2$, since $\Delta P_i = 1/2$ for municipalities with $D = 1$ and $\Delta P_i = 0$ for those

with $D = 0$. Second, after other elements in general revenues are controlled, ΔM_i will be the net change in the lump sum payments for the SEA programs after the 2005 reform in municipality i. Then, $\gamma \cdot W_i = \lambda \cdot W_i \Delta M_i$ so that $\gamma = \lambda \cdot \Delta M_i$, since $\Delta M_i = 0$ for municipalities with $W = 0$ *if the LAT compensation is exact*. Then, if the amount of LAT compensation (*CE* in Figure 1) is identical among LAT recipients, W_i will capture the negative of the income effect as $\Delta M_i < 0$ for municipalities with $W = 1$.

However, LAT compensation may not be exact and identical among LAT recipients. If so, ΔM_i takes different values among municipalities, and $\gamma \cdot W_i$ departs from the actual effects of the 2005 reform, as argued with Figure 2. In that case, we would want to obtain municipal data for CE_i and $C'E_i$, and directly use data $\Delta M_i = -CE_i + C'E_i$ for LAT recipients and $\Delta M_i = -CE_i$ for non-recipients. Regrettably, we have no choice but to proceed with W_i because data for ΔM_i are unavailable. If ΔM_i varies across municipalities, we interpret the coefficient of W_i as follows. Rewrite $\lambda \cdot \Delta M_i \equiv \kappa + \gamma \cdot W_i + e_i$, where κ is constant and e_i is the error term. Given (2), κ is absorbed in constant (α) and $e_i \equiv \lambda \cdot \Delta M_i - \gamma \cdot W_i$ is included in the error term (Δu_i). We then see that W_i would suffice if we can determine variations in e_i that are correlated with regressors included in (2). For this purpose, we include a number of fiscal variables as well as regional characteristics as ΔX_{it}.

We are aware that, in principle, using the linear response model (3) does not allow for municipal choice at kink point as *C* in Figure 3. However, our data may of course include municipalities that spent at the kink point. Further, as we will see, our data do not allow us to distinguish between municipalities that had spent *F* and those that had spent less than *F*. In this respect, using DD regression (2) for discrete changes in *P* would circumvent the theoretical inconsistency arising from infinitesimal changes in price at the kink point. Since the coefficients of the dummies also could be seen as an average treatment effect with DD estimation, the estimates potentially include the effect on municipalities that had set their expenditures at the kink point.

3.2 Data and variables

There are no official data[5] about SEA programs that contain information on the

[5] The MEXT conducted several reports based on sporadic surveys. But they did not cover the periods we are interested in (i.e., before and after 2005) and did not disclose the data on municipality basis.

program implemented by each municipality for the period before and after 2005. Yuda (2009) conducted a survey on SEA programs by sending questionnaires to all municipalities in 2007, to which 1,108 municipalities responded (a response rate of 60.6 percent). His survey is the only available source that contains municipal data on SEA programs. In particular, it contains data for 2004 and 2007. Thus, we can compare municipal responses before and after the 2005 reform.

3.2.1. Dependent variables:

The key dependent variables are obtained from Yuda (2009). In line with the discussion the previous discussion in the previous section, SEA benefits per recipient are employed as the dependent variable. Two versions of per-recipient benefits are available: (a) per-recipient benefits for the first year of elementary school, and (b) those for the first year of junior high school. We employ these two measures alternately.

We also utilize the following alternative measures, although employing them may be inconsistent with the theoretical framework discussed with Figures 1–3. One measure is (c) eligibility criteria for Category II SEA recipients. Yuda (2009) recorded such eligibility criteria for 2004 and 2007 as multiples of the minimum cost of living uniformly set by the central government for the system of public assistance. The income level based upon a multiplier of the national standard thus constitutes the income threshold for determining eligibility for benefits. We use the multiples as a measure for eligibility criteria.

We also consider (d) the number of the Category II recipients. We express the size in terms of the assistance rate, i.e., the percentage of Category II recipients among pupils attending public primary and junior high school. However, their data for 2004 and 2007 are not available in Yuda (2009). We instead obtained data from MEXT, courtesy of the Secretariat for the House of Councilors.

3.2.2. Dummies for uncapped municipalities and non-LAT recipients

Although municipal data for the amounts of SEA grants and expenditures are not officially available, Yuda (2009) provides the average subsidy rates for municipal SEA expenditures in 2004. We can thus check by looking at these average rates

whether SEA grants were capped before the 2005 reform. They were capped if the *average* rate is *below* 50 percent and uncapped if it is just 50 percent. We thus define $D_i = 1\{ASR_i = 0.5\}$ where ASR_i is the average subsidy rate of SEA grants for municipality i. Note that $1\{ASR_i = 0.5\}$ cannot distinguish between municipalities that spent less than and those that spent exactly equal to the capping level (i.e., F in Figures 1–3). Therefore, as mentioned, the estimated coefficient of D should be interpreted to include the effect on those municipalities that chose at the kink point.

Given the allocation rule of the LAT, the dummy variable for non-LAT receipt for municipality i is given by an indicator function $W_i = 1\{SFD_i/SFR_i < 1\}$, where SFD_i and SFR_i are values for the standard fiscal demand and the standard fiscal revenues of municipality i, respectively, in 2007. Their data for SFD_i and SFR_i are obtained from the Ministry of Internal Affairs and Communications (2009). Although the dummy for the non-LAT status intends to capture the income effects of the 2005 reform, it may not exactly estimate them if the LAT compensations were imperfect, differentiated, or both, as mentioned.

To allow for the possibility that the non-LAT dummy variable does not work properly, we consider changes in municipal general grants in place of the non-LAT dummy. In doing so, we differentiate between general revenues from the central government and those from the municipality's own sources. The former consists of the amount of (ordinary) LAT grants and the amount of the Local Transfer Taxes. For the latter, we use local tax revenues. These variables are obtained from the Ministry of Internal Affairs and Communications (2006, 2009). We normalize all of these revenue variables per recipient, using the total number of SEA recipients (i.e., the combined amount of Category I and Category II recipients) obtained from MEXT data.

3.2.3. Controls

Control variables are enumerated as follows. First, even in case we use W_i, we also include as control variables the changes in per capita general grants and per-recipient local taxes just mentioned. In particular, it may look redundant to include the per-recipient general grant. However, although W_i by construction is zero for non-LAT recipients, the general grant is not, since it includes the Local Transfer Taxes (so that this does not conflict with the employment of W_i). Our intention to

include these two variables here is to control whatever D_i alone could not control.

Second, we allow for local fiscal stringencies since municipalities with more stringent general accounts might want to contain SEA expenditures more earnestly. To capture this effect, we consider the "obligatory" expenditure ratio, which is the percentage of general revenues used for expenditures that are not easily reduced, like public employee wages and debt payments. The ratio thus shows the relative size of "fixed" expenditures financed from local revenues that are not earmarked for specific expenditures. Thus, a large value for the ratio indicates greater fiscal stringency. Another popular index for fiscal stringency in the literature on Japanese local public finance is the fiscal capacity ratio (FCR), a three-year average of the ratio of SFR to SFD. Defined as such, a large value for FCR is associated with more fiscal "capacity" in that the standardized measure of local taxes (SFR) is relatively larger than the standardized measure of fiscal needs (SFD) in a given municipality.

We may also want to control the relative impact of the abolishment of SEA grants as well as the compensation through the LAT, which should be different among localities. We measure the former in terms of the average subsidy rate, *ASR*, used in the index function for D_i. The logic is that if the share of grants constitutes a larger portion of total SEA expenditures, the impact on the change in per-recipient benefits will be larger after grants are abolished. Since (2) uses the variables in changes from 2004 to 2007, we use $\Delta SAR_i = -SAR_{i2004}$ because SAR_{it} is zero in 2007. The impact of the compensation through the LAT is measured in terms of the ratio of SFR to SFD in 2007. Admittedly, this is akin to FCR mentioned above. However, although FCR is a three-year average and differenced for (2), the ratio here is only for 2007 and in level (not differenced) as the impact of LAT compensation was non-existent in 2004. Note also that we drop the ratio here when we replace D_i with the two general revenue variables (per capita general grants and local taxes) in the regression.

Last, we include a set of controls that reflect socioeconomic factors and may affect the need for SEA programs. We obviously consider the percentage of pupils that attend compulsory education among total population. In addition, we include the percentage of the population aged 65 and older to control the impact of aging on education-related public spending (Poterba 1998). We add the percentage of income tax payers among the population, which should be inversely related to the percentage

of *un*taxed individuals, which represents the degree of poverty. Finally, we include local population to control whatever it controls. All of these annual municipal data are obtained from the Nikkei Chi'iki Joho Data Base and the System of Social and Demographic Statistics.[6]

If we are to interpret these control variables as the regressors in the linear response model (3), we could assign and discuss expected signs of the coefficients of some of the control variables above. However, we would rather interpret them as variables that control whatever they control in the DD regression (2). As such, we are not immediately worried about the signs and statistical significance of the estimated coefficients of control variables.

3.2.4. Samples

The response rate of Yuda's survey is about 60 percent, with 1,180 replies among 1,804 municipalities. In addition, as we compared values between the two years, we had to exclude municipalities that merged or disappeared from 2004 to 2007. These exclusions reduce the size to less than half the number of returned questionnaires. Further, there are blank answers in returned questionnaires, making our sample size vary from 353 to 544 over the four variables considered. Table 1 lists four sets of summary statistics in different sample sizes for the alternative dependent variables.

Table 1

This large reduction in sample size may result in sample selection bias. However, we argue that the problem is not serious. Sample selection bias occurs when the errors in (2) are correlated with municipal decisions of not to amalgamate with other municipalities or of not to answer the questionnaire. However, it would be difficult to show convincingly how they are correlated. First, it is not straightforward to relate them. Empirical studies in the Japanese literature show that decisions to amalgamate were influenced by population, surface area, and fiscal factors (Hirota 2006). Likewise, Yuda (2009) points out that failure to return the questionnaire or to provide answers in returned questionnaire is due to inadequate municipal

[6] The SSDS (*Shyakai Jinko Tokei Takei*) is the regional data base constructed and maintained by the Statistics Bureau, the Ministry of Home Affairs and Communications

administrative capacity,[7] which is related to population size and fiscal stringency. Since our model is conditioned on these factors as well, we may argue that the error term would not be correlated with decisions not to amalgamate or not to answer the questionnaire. Second, even if they had been correlated, the selection effect is differenced out along with unobserved heterogeneity in (2) when its magnitude is constant during the two time periods. Although it may still be possible for the selection effect to vary over time (Kyriazidou 1997), it should be safe to assume otherwise here, since, as stated, our regression includes variables that might affect the selection processes.

3.3. Manipulation of treatments?

Since municipalities chose the level of SEA expenditures, they also *chose* to receive either the uncapped or capped amount of the SEA grants. As such, the dummy variable D_i = 1{ASR = 0.5} may be thought to be manipulated to gain as a result of the reform. Note that they had chosen to do so in 2004, one year before the 2005 reform. If they had known the change in advance, there is a possibility of manipulation on the municipal side to change D_i in advance. However, we argue that this possibility is low. Recall that, as illustrated in Figures 1–3, the budget line on which a municipality is located after the reform is independent of the choice it made before the reform. Wherever a municipality was located before the reform, its location afterward will depend only on whether it is a LAT recipient. Therefore, municipalities had no incentive to manipulate the choice of D_i in 2004 so as to gain after the 2005 reform.

This argument leads us to suspect that municipalities may choose to become LAT recipients since they can gain by doing so. We argue that this possibility also is negligible. First, municipalities might try to increase SFD to become recipients, but such manipulation would be difficult since, given the formula for SFD, they can do so only by increasing the number of students at elementary and junior high schools in

[7] This should partly be substantiated by the fact that more municipalities answer questions that pertains to the data in 2007 than those in 2004. Recall that Yuda's survey was conducted in 2007. As such, blank answers for 2004 data should be due to missing documents for 2004 or costs for the personnel in charge to find past data in municipal offices. Municipalities with administrative capacity would systematically file their documents and easily retrieve them with ease.

their jurisdictions. Doing so would be a possibility, but likely costly compared to the gain obtained through the LAT. Second, even when a change in SFD could be made, many factors unexpectedly undo the induced increase in the SFD. Changes in SFD depend more on changes in other items; for example, changes in items included in capital expenditure are more volatile. Also, SFR matters as LAT grants are given when $SFR/SFD < 1$. Since the SFR reflects tax revenues, its changes respond to the business cycle, which changes independently of SFD. Last, when the initial estimate for the total LAT grants exceeds the central revenues earmarked for their disbursements, the amount of SFD is reduced in an unexpected proportion that applies uniformly to all localities. And this happens almost every year.

We therefore argue that the possibility of such control of the recipient status (W_i) would be negligible since municipalities could hardly manipulate the status of the LAT receipt. This claim is supported by the distribution of municipalities in our sample for 2004 in Figure 1. If non-recipients manipulate their SFDs to become recipients, we would plausibly see a noticeable "hump" in the distribution just to the right of $SFR/SFD = 1$. But such a hunch is hardly observed in the figure.

Figure 4

4. Results

We have performed ordinary least squares on regression model (2) with or without control variables explained in previous sections. Tables 2 and 3 list estimation results for changes in the four alternative dependent variables: (a) per-recipient benefits for first-year elementary school students, (b) per-recipient benefits for first-year junior high students, (c) eligibility criteria as multipliers of the national minimum cost of living, and (d) the logit-transformed percentage of Category II recipients among primary and junior high students. For changes from 2004 to 2007 in each of the four variables, we examine six combinations of regressors. Our main regressors are D_i, which intends to identify the price effect of abolishing the matching element of SEA grants, and W_i, which intends to capture the income effect of taking away LAT compensation. The first column (i) considers the case only with the two

dummy variables and a constant (drift). The second column (ii) lists the case with changes in general revenues in place of W_i. The third and fourth columns show results with control variables, with (iii) for (i) with controls and (iv) for (ii) with controls. As explained, the two general revenue variables (per capita general grants and local taxes) are included for (ii).

4.1. Per-recipient SEA benefits

Results for the SEA benefits show generally expected results for the effect of the loss of the matching component of the SEA grants (price effects). For first-year students at elementary school, the coefficient estimates on D show negative signs, indicating that abolishing the matching grants reduced per-recipient benefits by JPN¥3,400–5,400. However, results are statistically significant for (i), (iii), and (iv) at the 0.10 level and are insignificant for (ii). The insignificant coefficient for (ii) turns significant with inclusion of the controls in (iii). If we assume that results with controls are more reliable, we may be allowed to imply that benefits were reduced by approximately JPN¥5,000 (US$56).

The analogous results are stronger for first-year students at junior high schools. All signs are negative and statistically significant, implying that loss of the matching component reduced per-recipient benefits between JPN¥8,700 and JPN¥12,000. In addition, all are statistically significant at the 0.10 level, and (iii) is also significant at the 0.05 level. If we are allowed to pick the results with controls, we could argue that the 2005 reform reduced per-recipient benefits by about JPN¥12,000 (US$133).

We then consider the effects of the loss of the lump-sum component of the SEA grants (income effects). The coefficients of W_i for first-year students at elementary school are statistically significant at the 0.05 level, but all signs are positive, indicating that SEA benefits are on average an inferior good for municipalities. Although this is theoretically possible, we are suspicious of this unexpected result. First, we expect signs for general grant and tax revenues to be positive (negative) and statistically significant if the SEA benefits are normal (inferior) goods, since they also are expected to exert income effects. However, their signs are statistically insignificant with different signs, yielding some inconsistency if the structural interpretation applies. Second, the results for the junior high school students are different. Although the sign

is positive without control variables (i), it turns negative if controls are included (iii), although the estimate is statistically insignificant. Note that *W* also indicates "rich" municipalities. We may suspect that the variables are not sufficient to control for the possibility that rich municipalities may set higher benefits for first-year elementary students. It might be that the SEA benefits demonstrate no income effects for municipalities.

Table 2

4.2. Eligibility criteria and the size of recipients

Table 3 lists analogous results for the eligibility criteria in terms of the multiplier of the minimum cost of living set by the national government and the size of recipients in terms of the logit-transformed percentage of Category II recipients among students at elementary and junior high schools.

Results for the eligibility criteria are as follows. First, effects of matching grants are all positive, but they are statistically insignificant in cases with control variables. The effects of the no compensations (*W*) and other fiscal variables are also statistically insignificant, except SFR/SFD for (iii). In addition, the regressions fit the data poorly, with negative values of adjusted R^2. This may be because the criteria are nearly a formality and many municipalities do not rigidly follow them when actually assessing who is eligible. Indeed, as Yuda (2009) shows, more than half (61.1 percent) of his survey's respondents indicated they do not strictly observe eligibility criteria: they sometimes provide benefits even when income levels of SEA applicants exceed thresholds, depending on specific circumstances of the applicants.

Table 3

On the other hand, the effects of matching grants on the number of recipients are negative and statistically significant in cases with control variables. The results for (iii) and (iv) show that the loss of matching grants reduced the percentage of Category II recipients by 0.123 and 0.224, respectively (in logit-transformed units). When evaluated with the national percentage of Category II recipients in 2004, it is approximately equivalent to a 1.2 percentage point reduction for (iii) and a 2.1

percentage point reduction for (iv) from 11.52 percent in 2004. However, effects of the lump-sum component of SEA grants are again statistically insignificant, although their signs are negative for the case with control variables (iii).

Note that the two cases of recipient percentage with control variables (cases iii and iv) fit better than any other cases with alternative dependent variables. In particular, general grants, obligatory expenditure ratio, average subsidy rate, percentage of the elderly, and population are statistically significant with smaller P values (less than 0.05). The signs of some variables are expected. A larger elderly population implies larger social expenditure needs, and the elderly may be politically more vocal than SEA recipients, exacerbating the reduction in the number of SEA recipients. But some signs are unexpected like those for general grants and the obligatory expenditure ratio. If we reason that larger budgets stimulate expenditures, we would expect a positive sign for the former and a negative sign for the latter. However, since general grants and the obligatory expenditure ratio tend to be anti-cyclical and the number of recipients is thought to be pro-cyclical, this may simply show that good economic climates reduce numbers of recipients.

5. Concluding Remarks

We have examined the effects of central grants for School Expense Assistance in Japan, using the 2005 reform that replaced SEA grants with an increase in LAT grants. To identify the effects of SEA grants, we exploited the facts that the matching grants were closed-ended and the compensations were made only to LAT recipients. We have then shown that the reform suppressed the SEA expenditures. The loss of the matching component of the grants reduced per-recipient SEA benefits approximately JPN¥5,000 (US$56) for first-year elementary students and JPN¥12,000 (US$133) for first-year junior high students. The size of Category II recipients was also reduced by 1.2–2.1 percentage points, whereas the eligibility criteria were not much affected. We note, however, that these effects were realized only in municipalities that had faced 50 percent matching grants before the 2005 reform. As Table 1 shows, such municipalities occupied around 5 percent of the sample observations. In addition, we did not find compelling evidence for the effects on municipalities whose SEA grants

had been capped before 2005, since our four dependent variables responded little to changes in the lump-sum element of grants or general revenues. Therefore, the effects of the reform were limited in terms of the number of municipalities.

However, our results imply that "decentralization" did not help to alleviate increasing child poverty, since the abolishment of the matching grants is shown to have suppressed local SEA programs. The 2005 reform was undertaken in the name of decentralization, which in this case refers to the replacement of categorical grants with general transfers of an equivalent amount so that localities could choose among expenditure items as they wish. Our analysis would indicate that, given the large local discretion in programs, the reinforcement of the matching, not lump-sum, element is required for effective implementation of the decentralized redistributive program. We believe that the Japanese case examined in our study constitutes a useful case that provides a lesson to other countries by pointing out an example of the negative effects of decentralization.

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Figure 1. Effect of the 2005 reform: Exact LAT compensation

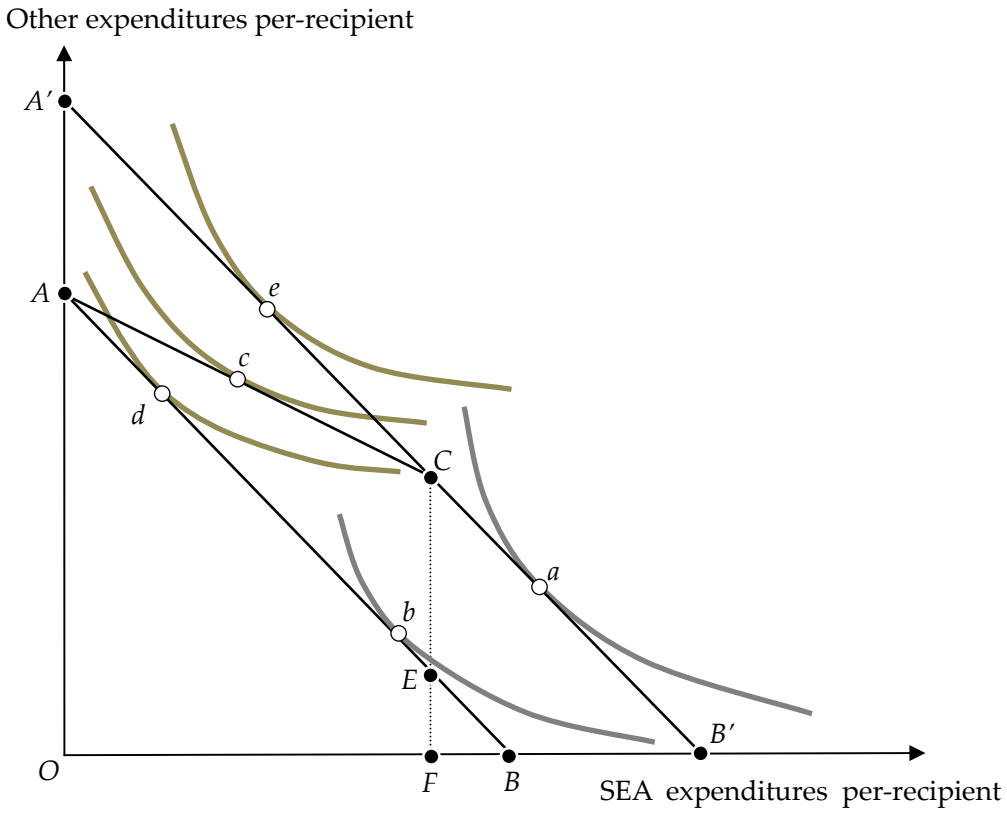

Figure 2. Effect of the 2005 reform: Partial LAT compensation

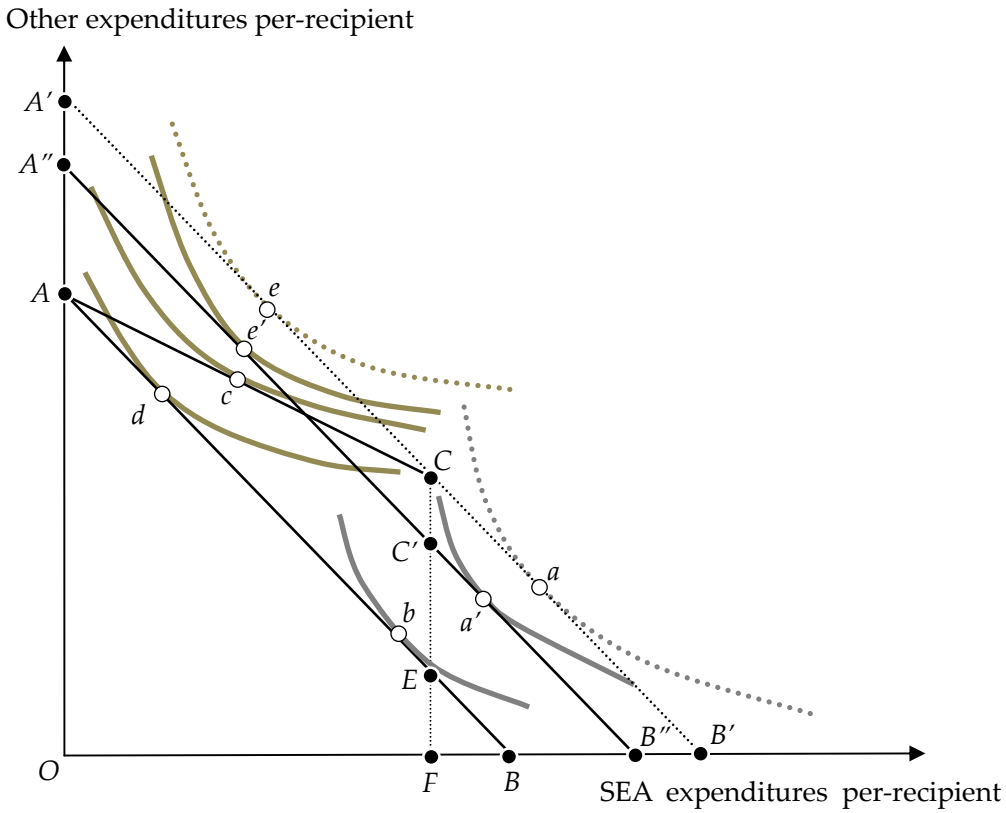

Figure 3. Effect of the 2005 reform: Choice at the kink point

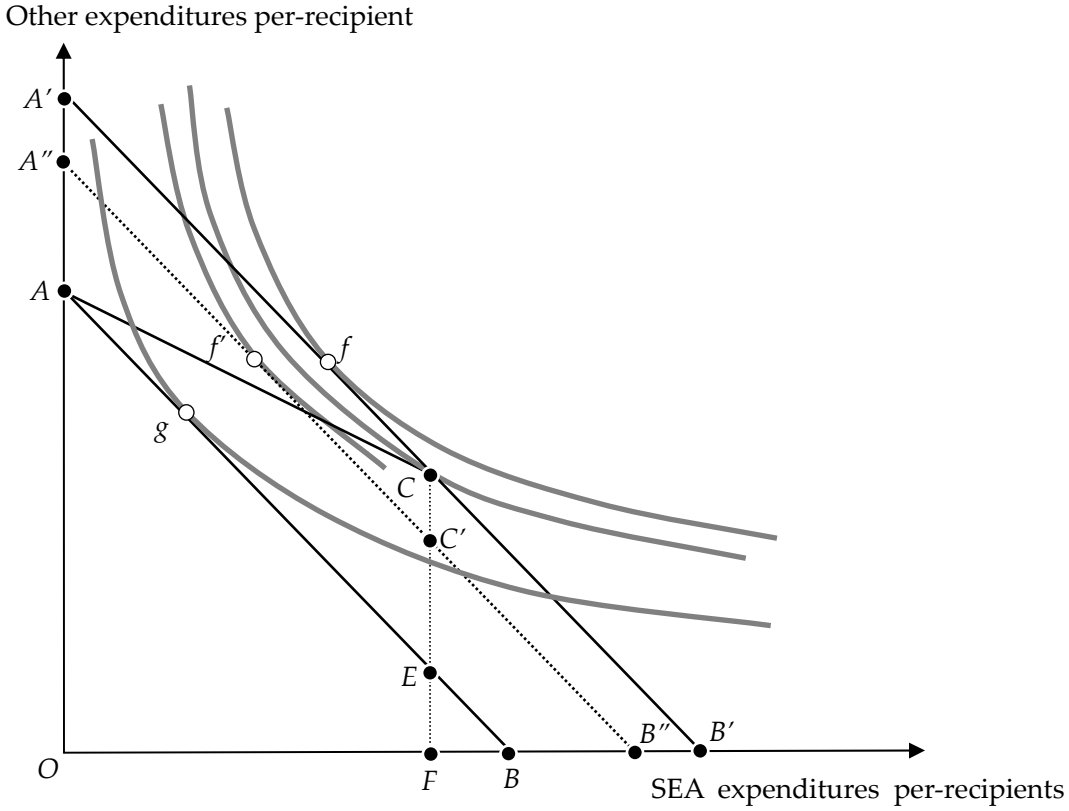

Figure 4. Distribution of cities according to fiscal capacity index

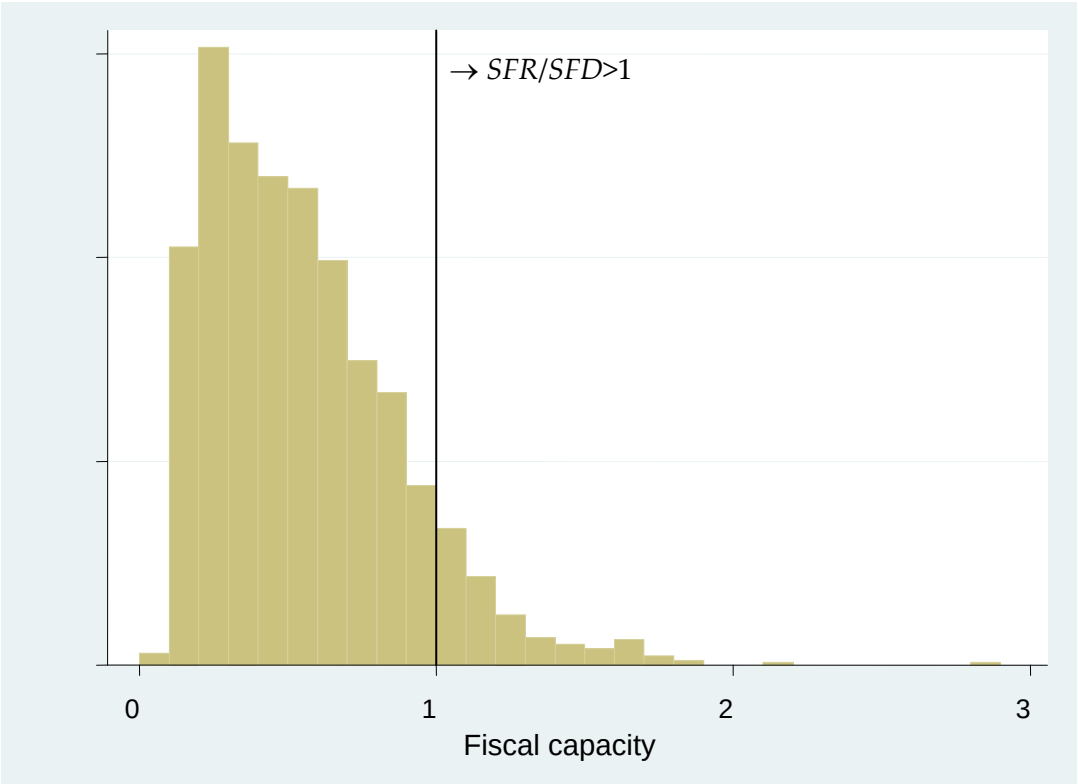

Table 1. Sample statistics

Dependent variables / Variables	Per-recipient SEA benefits: 1st year elementary school (1000 yen)				Per-recipient SEA benefits: 1st year junior-high school (100yen)				Eligibility criteria: multipliers on the minimum costs of living (percent)				The percentage of category II recipients among pupils (logit-transformed)			
	mean	s.d.	min.	max.	mean	s.d.	min.	max.	mean	s.d.	min.	max.	mean	s.d.	min.	max.
ΔY_i: dependent variables	0.563	11.751	–149.0	96.0	0.825	13.084	–100.0	127.0	–3.510	14.358	–150.0	54.0	0.112	0.322	–2.417	1.904
D_i = 1{Uncapped SEA grants}	0.051	0.220	0.000	1.000	0.055	0.229	0.000	1.000	0.031	0.174	0.000	1.000	0.048	0.214	0.000	1.000
W_i = 1{Non-LAT recipient}	0.166	0.372	0.000	1.000	0.168	0.374	0.000	1.000	0.212	0.410	0.000	1.000	0.165	0.372	0.000	1.000
$D_i \times W_i$	0.011	0.105	0.000	1.000	0.011	0.105	0.000	1.000	0.011	0.106	0.000	1.000	0.009	0.096	0.000	1.000
ΔGeneral grants per recipient (1,000,000 yen)	–1.499	32.40	–444.2	263.0	0.007	45.38	–444.3	673.7	–0.935	26.97	–199.2	264.13	3.790	79.53	–444.3	1532.5
Δ Local tax revenues per recipient (1,000,000 yen)	0.485	11.45	–101.8	96.2	0.698	11.92	–101.8	96.2	0.982	11.22	–45.69	96.23	2.144	29.65	–101.8	628.8
Δ Obligatory expenditure ratio (percent)	0.651	5.075	–20.1	22.4	0.667	5.086	–20.1	22.4	0.589	5.018	-20.1	19.2	0.835	5.043	–20.1	22.4
Δ Fiscal capacity index	0.038	0.060	–0.200	0.760	0.038	0.060	-0.200	0.760	0.043	0.066	-0.130	0.760	0.038	0.060	–0.200	0.760
Average subsidy rate ×(–1) (percent)	–24.30	10.26	–50.00	0.00	–24.4	10.37	–50.00	0.00	–23.0	9.692	–50.00	0.00	–24.2	10.290	–50	0.00
SFR/SFD	0.648	0.357	0.089	2.101	0.648	0.358	0.089	2.101	0.713	0.347	0.110	1.962	0.643	0.365	0.089	2.101
ΔPercentage of pupils	–0.002	0.005	–0.018	0.026	–0.002	0.005	–0.018	0.026	–0.001	0.005	–0.018	0.026	-0.003	0.005	–0.022	0.015
Δ Percentage of elderly (65+)	0.019	0.008	–0.029	0.047	0.019	0.008	–0.029	0.047	0.020	0.007	–0.006	0.047	0.019	0.008	–0.029	0.047
Δ Percentage of income taxpayers	0.044	0.019	–0.029	0.177	0.044	0.019	–0.029	0.177	0.045	0.017	–0.029	0.177	0.042	0.012	–0.029	0.074
Δ Population (1,000 persons)	0.711	4.287	–7.787	45.747	0.719	4.296	–7.787	45.747	1.242	5.026	–7.787	45.747	0.935	5.058	–7.228	67.87
Sample size	452				452				353				544			

Table 2. Results: Per-recipient SEA benefits

Dependent Var. / Explanatory Variables	Per-recipient benefits for students at the 1st year elementary school				Per-recipient benefits for students at the 1st year junior high school			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
D_i = 1{Uncapped SEA grants}	−4.076*	−3.472	−5.435*	−4.992*	−9.436*	−8.696*	−12.15**	−11.69*
	(2.447)	(2.433)	(2.919)	(2.865)	(5.197)	(4.807)	(5.346)	(5.301)
W_i = 1{Non-LAT recipient}	3.407**		2.939**		2.162*		−0.020	
	(1.428)		(1.416)		(1.198)		(1.620)	
ΔGeneral grants per recipient		−0.059	−0.040	−0.035		−0.008	−0.003	−0.000
		(0.051)	(0.033)	(0.034)		(0.035)	(0.037)	(0.036)
ΔTax revenues per recipient		0.165	0.121	0.100		0.072	−0.082	0.108
		(0.178)	(0.107)	(0.114)		(0.057)	(0.071)	(0.070)
ΔObligatory expenditure ratio			−0.011	−0.010			−0.216**	−0.204*
			(0.078)	(0.080)			(0.109)	(0.109)
ΔFiscal capacity index			17.85	24.36			-3.319	0.317
			(16.23)	(15.44)			(8.803)	(7.919)
Average subsidy rate ×(−1)			−0.061	−0.058			−0.127**	−0.110*
			(0.044)	(0.044)			(0.062)	(0.060)
SFR/SFD			−0.222				3.401	
			(2.338)				(2.359)	
ΔPercentage of pupils			139.4	169.3			17.02	62.31
			(131.7)	(129.1)			(130.7)	(138.2)
ΔPercentage of elderly (65+)			−162.0	−155.6			−102.9	−82.10
			(104.1)	(106.5)			(93.40)	(91.58)
ΔPercentage of income taxpayers			−69.87**	−76.23**			−14.41	−16.42
			(34.69)	(35.62)			(33.88)	(34.56)
ΔPopulation			−0.159**	−0.104*			0.008	−0.070
			(0.066)	(0.059)			(0.086)	(0.098)
Constant (drift)	0.205	0.572	4.724	5.081	0.983	1.356**	−0.870	1.126
	(0.615)	(0.545)	(4.039)	(3.510)	(0.649)	(0.564)	(3.041)	(2.669)
Degree of freedom	449	448	439	441	449	448	439	441
R^2	0.017	0.025	0.055	0.050	0.031	0.034	0.052	0.044
Adjusted R^2	0.013	0.018	0.034	0.029	0.026	0.028	0.026	0.022
Sample size	452				452			

Notes: 1. Robust standard errors are in parentheses.
2. Asterisks ***, **, and * indicate statistical significance at the .01, .05, and .10 levels, respectively.

Table 3. Results: Eligibility criteria and recipient percentage among students

Dependent Var. / Explanatory Variables	Eligibility criteria as a multiple of minimum cost of living				Logit-transformed recipient percentage among students			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
D_i = 1{Uncapped SEA grants}	3.720*** (0.886)	3.609*** (0.771)	0.422 (2.082)	0.568 (2.048)	–0.058 (0.081)	0.005 (0.062)	–0.123* (0.069)	–0.224** (0.098)
W_i = 1{Non-LAT recipient}	–0.625 (2.015)		–3.502 (2.977)		0.005 (0.025)		–0.045 (0.035)	
ΔGeneral grants per recipient		0.017 (0.026)	0.033 (0.028)	0.034 (0.027)		–0.177** (0.072)	–0.177** (0.073)	–0.174** (0.071)
ΔTax revenues per recipient		–0.004 (0.044)	–0.044 (0.058)	–0.052 (0.059)		–0.179 (0.233)	–0.176 (0.246)	–0.189 (0.242)
ΔObligatory expenditure ratio			–0.072 (0.185)	–0.041 (0.184)			0.379** (0.020)	0.445** (0.019)
ΔFiscal capacity index			8.95 (10.36)	11.76 (10.96)			0.161 (0.218)	0.273 (0.184)
Average subsidy rate ×(–1)			–0.100 (0.071)	–0.083 (0.069)			–0.441*** (0.143)	–0.421*** (0.141)
SFR/SFD			4.423* (2.688)				0.097 (0.062)	
ΔPercentage of pupils			58.26 (186.5)	68.55 (196.6)			–5.989* (3.609)	–4.393 (3.363)
ΔPercentage of elderly (65+)			–276.7 (180.6)	–268.1 (178.8)			–4.555*** (1.472)	–4.238*** (1.423)
ΔPercentage of income taxpayers			–3.836 (50.09)	1.727 (53.11)			–2.095 (1.662)	–1.566 (1.474)
ΔPopulation			–0.063 (0.127)	–0.060 (0.123)			–0.400*** (0.135)	–0.339*** (0.131)
Constant (drift)	–3.493*** (0.853)	–3.608*** (0.783)	–2.762 (5.164)	–0.464 (5.021)	0.115*** (0.016)	0.122*** (0.011)	0.119 (0.073)	0.149** (0.075)
Degree of freedom	350	349	340	342	541	540	531	533
R^2	0.002	0.002	0.026	0.021	0.002	0.349	0.392	0.388
Adjusted R^2	–0.003	–0.006	–0.008	–0.008	–0.002	0.345	0.379	0.377
Sample size	353				544			

Notes: 1. Robust standard errors are in parentheses.
2. Asterisks ***, **, and * indicate statistical significance at the .01, .05, and .10 levels, respectively.