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The Political Economy of School Size: Evidence from Chilean Rural Areas

FRANCISCO A. GALLEGO   CARLOS RODRÍGUEZ   ENZO SAUMA

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JEL Classification Number: I22, H52, H75

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Francisco Gallego, **Carlos** ***Rodríguez and Enzo Sauma***
Pontificia Universidad Católica de Chile

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Keywords: School size, rural schools, consolidation, Chile, education decentralization, political economy, soft budget constraints.

JEL codes: I22, H52, H75.

* Corresponding author: Francisco A. Gallego, fgallego@faceapuc.cl. Av Vicuña Mackenna 4860, Macul, Santiago, Chile. Phone Number: (56-2) 354-4321, Fax Number: (56-2) 553-2377.

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1. Introduction

Providing education in rural areas in an effective and efficient way is a policy priority in the developing world. Some authors suggest that decentralization of school management could improve the quality and quantity of education (Oates, 1972; Inman and Rubinfeld, 1997; Fuchs and Woessman, 2004; Woessman, 2003; Gallego, 2009). Others argue that decentralization can create inefficient or unequal provision of education (See Haggard, 1999 and Bardhan, 2002 for reviews, Kremer et al., 2002 and Galiani et al., 2009 for empirical evidence, and Gennaioli and Rainer, 2004 for a theoretical model). For instance, decentralization in the absence of local checks and balances could allow elites to capture the local government and block the provision of public goods, or to distribute expenditures towards their members.

In this paper, we investigate whether expenditure in rural areas is efficient or not in the Chilean decentralized system. In order to tackle this problem we first study the cost structure of the provision of education in rural areas. We show that there exist significant economies of scale. Moreover, we show that there are potential net benefits associated with school consolidation, i.e., economies of scale more than compensate required additional infrastructure and greater travel distances. Then, we posit an institutional explanation for such suboptimal choice of school size. Mayors, we argue, face electoral costs if they decide to close and merge schools and soft budget constrains allow them to run deficits associated with the suboptimal size structure. Our empirical finding that lack of political competition together with a closer relationship between the local and central government (our proxy for the softness of local government budget constraints) decreases the extent of the inefficiency is in line with such explanation. Thereby, we learn that in order to capture the benefits from decentralized school management, we require an institutional setting that prevents conflicts of interest for local political officers.

Te institutional setting in which public schools in Chile operate is central for our findings. Public schools in Chile receive a per-student subsidy depending on enrollment, and are managed by local governments. These local governments tend to face soft budget constraints because most of them operate under education deficits that can be financed with non-voucher transfers from the central government (Serrano and Berner, 2002; Gallego, 2006). In addition, in rural areas, there is usually just a few schools in each market, and hence parents face fewer options than in urban areas.[1]

The scale of operation has serious consequences for the level and differences between urban and rural schools in terms of educational expenditures.[2] Thus, the low number of students in rural areas may result in higher per-student expenditures. Because per-student subsidies do not (for the most part) depend on the size of the school, the higher per-student expenditures translate into a financial deficit that affects rural school operators.[3] In this paper, we use an IV approach that exploits the split of big municipalities into small ones and population shocks to explore the potential existence of economies of scale. We study these economies of scale in two dimensions: at the municipal administration level[4] and at the school level. We find that while there exist important economies of scale at the school level, economies of scale at the municipal administration level are neither statistically nor economically relevant. Our estimates suggest that about 75% of the differences between per-student expenditures in rural and urban areas are due to rural schools being smaller.

Next, we show that there is significant potential room for consolidation of small rural schools into bigger schools. Using geographical information for a sample of schools, we find that, in our preferred estimate, about one half of the enrollment in rural schools may be subject to a process of consolidation in which students would go to bigger schools without traveling more than one hour a day to their new schools (which is comparable to what students in urban areas travel to school). Alternative estimates using more optimistic and conservative assumptions imply that 54% and 34% of the students could be consolidated into bigger schools.

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[1] This phenomenon seems to be largely explained by the existence of economies of scale in the provision of schooling (see evidence for the US in Andrews et al., 2002 and for Chile in Tironi, 2004). Tironi (2004) argues that at least 650 pupils are needed for a subsidized private school to provide quality education in a disadvantaged municipality. Since the average number of students in Chilean municipalities without voucher schools is 886 pupils, there should be no space for more than one good school in that municipality operating without losses.

[2] In previous research we show that the differences in educational outcomes between rural and urban schools in Chile are mostly due to differences in the socioeconomic characteristics of the students, with the size of operation of the schools or school districts having only second order effects on quality (see Gallego et al. 2007).

[3] In Chile, there exists a subsidy that guarantees the supply of resources to the schools for at least the equivalent of 35 pupils. However, these resources are not sufficient to finance the average student cost.

[4] In Chile school districts exactly correspond to the area of local governments and therefore local governments manage all public schools in each municipality.

We also show that the benefits of school consolidation in terms of cost savings more than compensate the additional infrastructure, transportation, and opportunity costs associated to the expansion of current schools into bigger schools and to the additional distance from school to the students' homes. In other words, we find a big inefficiency in the size of schools managed by local governments.

We then hypothesize that this inefficiency may be due to the existence of incentive problems for mayors: closing schools in municipalities may be harmful for their electoral prospects. So they run deficits that, given the existence of soft budget constraints, are financed at least partially with non-voucher transfers. Consistent with this claim and previous evidence (Gallego, 2006), we show that a decrease in the degree of political competition in a municipality with better access to non-voucher transfers from the central government decreases the extent of inefficiency in the allocation of students. This is consistent with our claim that consolidation has political non-trivial costs.

The results in this paper are interesting for different literatures. First, our results imply that decentralization of school management towards local governments under soft budget constraints could be inefficient. Local governments do not necessarily have incentives to minimize costs because in doing so they may face relevant electoral costs and, therefore, they exploit the softness of the budget constraint to incur in higher costs that are paid by non-voucher transfers. Thus, this paper comes to complement the literature on the effects of decentralization, which typically focus on education outcomes (eg., Fuchs and Woessman, 2004; Woessman, 2003; Gallego, 2009; Kremer et al., 2002 and Galiani et al., 2009) by providing evidence on the impact of decentralization on expenditures.

Second, and related to the previous point, our paper also contributes to the small literature on the political economy aspects of school and school district consolidation. (eg., Gustely, 1977). Our results imply that when political officials, as mayors, are in charge of education they do not only care about educational outcomes, but also about other objectives. Thus, they face a conflict of interest: they face non-trivial costs of closing and merging schools and probably need to compensate voters to do so. We present evidence that school consolidation in Chile is affected by political aspects.

Third, our results are related to the literature on school and school district consolidation in the US. Our results on the absence of cost savings at the *municipal* level may seem inconsistent with previous papers for the US that tend to find significant economies of scale at the school district level (Andrews et al., 2002). However, the opposite is true. Most of the studies for the US find that the economies of scale are relevant just for very small districts. For instance, Andrews et al. (2002) find that there seem to exist potential savings in instructional and administrative costs from moving very small districts with less than around 500 students into districts with around 2000-4000 students. Cost savings for bigger districts are less important. But in Chile just less that 20% of the municipalities have enrollment of less than 500 students, with the average municipality having an enrollment of about 2,500 students (and with most of the municipalities operating with enrollments in the interval between 600 and 3000 students). Thus, our evidence could be interpreted as consistent with the previous evidence for US given that the size of the school districts are around the cost minimizing levels. Moreover, we complement this literature by presenting instrumental-variable estimates (based on the splitting of municipalities and exogenous population shocks) of the determinants of costs. This use of instrumental variable help solves identification typically presents in studies for the US (as emphasized by Andrews et al., 2002).

Results on economies of scale at the school level are also consistent with evidence for the US (Deller and Rudnicki, 1993). Average (median) primary school enrollment in Chilean public schools is around 200 (70) students. More strikingly, average (median) primary school enrollment in Chilean rural public schools is around 75 (20) students. Deller and Rudnicki (1992) find that the cost minimizing school enrollment level is around 2,000 students. Thus, our result of a significant room to exploit economies of scale are not surprising because currently public schools in Chile are really small and far below cost minimizing levels.

The rest of the paper is organized as follows. Section 2 presents a brief description of rural education in Chile. Section 3 analyzes the determinants of school expenditures. Section 4 analyzes whether the small size of the schools could be due to prohibitive transportation or infrastructure costs. Section 5 studies the hypothesis that the size of the inefficiency in the number of schools is related to the interaction of political factors and the existence of soft-budget constraints and section 6 briefly concludes.

2. Rural education in Chile

Net enrollment in primary education in Chile is 97.8% in rural areas and over 99% in urban areas (CASEN, 2003). In terms of results of the educational process, Figure 1 shows average scores obtained by fourth-graders in the SIMCE mathematics test applied in the year 2005, per household income group.[5] The results show that, within all socio-economic groups, rural students perform significantly worse than urban students.[6] Regarding educational supply, Figure 2 presents an indicator of the relative number of voucher schools, which corresponds to the ratio between the number of voucher and municipal schools in the year 2005. This figure indicates that differences of educational supply strongly increase as the socio-economic level of the household increases. There are two interesting observations related to this figure: (i) for students in rural areas, the supply of voucher schools increases only slowly as the socio-economic level increases, and (ii) the pupils of a low socio-economic status from urban areas and rural areas face a very similar supply of voucher schools. The later point is confirmed by some indicators of the reasons why parents chose among different schools (Figure 3)–taken from data from surveys to parents of the 2005 SIMCE test.

Figure 3 shows that roughly 60% of the parents who send their children to municipal schools in rural areas do so because the establishment is close to where they live. In contrast, only 40% of the parents sending their children to municipal schools in urban areas choose schools based on location. This difference is similar in the case of parents who send their children to voucher schools: a little more than 30% of parents in rural areas choose school on the basis of location, whereas only 20% do so in urban areas.

Table 1 summarizes school characteristics by size, type of school, and area for 2005. From this table, we observe that rural schools have an average of 80 pupils and 5 teachers, whereas urban schools have 470 pupils and 21 teachers on average. There are some differences per type of school, with voucher schools being somewhat larger than municipal schools (92 versus 76 pupils, but with the same number of teachers).[7]

Figures 4 to 6 put this information in a dynamic perspective for schools located in rural areas. In terms of enrollment, we observe a significant drop in the number of pupils attending schools in these areas. Total enrollment dropped by close to 16% in the period

[5] SIMCE is the acronym for *Sistema de Medición de la Calidad de la Educación* (National System for the Assessment of the Educational Quality) from the Chilean Ministry of Education. This test is applied to students in 4th, 8th, and 10th grade and evaluates language, mathematics and (natural and social) science. We use the math test because, in general, as it is the best predictor of human capital; see for example Hanushek and Kimko (2000) and Barro (2001). In terms of socio-economic level, Gallego et al. (2007) shows a decomposition of these results considering mother education.

[6] In this paper we do not study the impact of rural education on test scores. Gallego et al. (2007) find that most of the differences between urban and rural students are related to socioeconomic status.

[7] Notice that this is not inconsistent with our discussion in footnote 1. Tironi (2004) defines the enrollment level for schools to have "good" academic outcomes. Most rural schools in Chile have poor performance in most academic indicators.

1992-2006 (equivalent to an annual drop of 1.2%). This drop in enrollment was related to a fall in school-age population close to 0.9% during that period.

Note that the drop in enrollment is only relevant for attendance at municipal schools, while voucher schools have maintained a virtually constant enrollment. Figure 5 shows that, at the same time, the number of municipal schools has fallen at a slower rate than the drop in enrollment. This explains the patterns observed in Figure 6, with a drop of close to 12% in average enrollment of municipal schools (from 70 pupils in 1992 to 62 in the year 2006). In contrast, voucher schools have maintained a constant average enrollment over the same period.

Finally, using data of the SINIM data base,[8] it is possible to carry out estimations of the average per-student expenditure in the municipal sector, for a sample of 345 Chilean municipalities in 2005. Rural municipalities[9] have per-student expenditures 30% higher that those of urban areas (about US$ 1,230 versus US$ 960 per year in average, where personnel expenses of the schools represent a little over 80% of total expenses).

All in all, rural education in Chile presents a high enrollment rate (although lower than in urban areas), lower quality than in urban areas, a lower supply of schools than in urban areas, and schools of smaller size. From a dynamic perspective, enrollment has fallen, and this fall has concentrated in municipal schools. The fall in enrollment, together with the inertia in the number of municipal schools, has translated into a significant drop in the average size of the schools. Consequently, in a context of strong economies of scale at the school level, per-student expenditures are increasingly higher in rural areas.

3. Public school expenditures and rurality

In this section we study the determinants of per-student expenditures in municipal schools.[10] As mentioned before, rural schools incur in higher expenses per pupil than urban schools. One of the competing hypotheses is that economies of scale put small schools, such as the rural ones, at a disadvantage. There could also be economies of

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[8] SINIM is the acronym for Sistema Nacional de Indicadores Munipales (National System of Municipal Indicators), which presents detailed information for all the Chilean municipalities.

[9] Rural municipalities are those that have less than 25% of their population living in urban areas.

[10] In this paper we study education expenditures, in contrast to education costs, given the fact that the analysis carried out does not consider any type of private or social cost of education other than expenditures actually incurred by the municipalities.

scale relative to the size of the municipal school administration. As the literature emphaises (eg. Andrews et al., 2002) both kinds of economies are completely different. This section studies this issue in detail.

We start by noticing that the existence of economies of scale does not imply that the school administrators will actually use them. It is worth asking whether the agents who operate municipal schools have the incentives to exploit these economies or not. It is not clear that municipal administrations have expenditure minimization as an objective, especially in a regime of soft budget constraints, as identified in Chile by several studies (Serrano and Berner, 2002; Sapelli, 2003; Gallego, 2006; and Gallego and Seebach, 2007). Therefore, our estimations do not recover the best existing technology, just the actual response of expenditures to certain determining factors in the current institutional context.

We shall divide the analysis in three parts. In the first part we study the relationship between total student expenditures and total enrollment at the municipality level. Next, we analyze the relation between per-student expenditures and the number of municipal schools in a municipality. Finally, we study the relationship between expenditure and the *average* size of the municipal schools in the municipality[11].

We assume the following functional form for expenditures:

$$E_{kt} = N_{kt}^{\beta} \exp\left(\mathbf{x}'_{kt}\,\alpha + \varepsilon_{kt} + \eta_k + \eta_t\right), \qquad (1)$$

where k refers to municipality and t to year, E is an expenditure measure, N is the total number of students (schools), $\boldsymbol{x}$ is a vector of controls including a rurality index, poverty rates (in level and logs), η_c is a municipality fixed effect, η_t is a time fixed effect, ε is a random shock, and α and β are parameters to be estimated. Our estimating equation corresponds to logarithm transformations of (1). Notice that the inclusion of municipality fixed effects implies we control for between municipality heterogeneity – ie., any factor that is time-invariant at the municipality level—and, consequently, the estimators identify within municipality effects.

Economies of scale imply that $\beta<1$. In contrast, diseconomies of scale imply that $\beta>1$. Thus, we test whether $\beta=1$ or not to identify the existence of economies of scale in education expenditures.

[11] In all estimations we use data from the SINIM for the years 1999 to 2005 for close to 300 municipalities.

Before proceeding to the estimates, a point has to be made regarding potential identification problems. Our focus is on studying the causal effect of school enrollment on per-student expenditures. For starters, it is worth emphasizing that the longitudinal nature of the data set allows us to control for time-invariant municipality effects. However, it is also possible that expenditures affect enrollment in a time variant manner, for instance, via migration of students between municipalities. It is also possible that there is measurement error in the enrollment variable, which may attenuate the enrollment coefficients, or the existence of time-varying omitted variables affecting both variables. To avoid these problems, our preferred estimates use instrumental variable methods.

Our identification strategy relies on two sources of exogenous variation: (i) a dummy that takes the value of 1 if the municipality loses territory, this refers to municipalities that were divided and, therefore, part of their population and schools comes to depend to other municipalities and (ii) a dummy that takes a value of 1 if the population of the municipality drops by 3% or more in one year (this instrumental variable is similar in spirit to the ones used by Kuziemko, 2006). In both cases the identification assumption is that both variables have no direct effect on the educational expense beyond their effect on enrollment.[12]

Column (1) of Table 2 presents the results of the first stage for total enrollment using only the dummy for split areas. This IV presents the expected sign and is highly significant (F-test of 47.4, well above the Stock and Yogo (2005) weak identification test critical values). Estimates imply that municipalities that were split decrease their enrollment in about 45 log points. In column (2), we include the dummy for a big drop in population and find that both IVs present the expected signs, but only the dummy for split municipalities is statistically significant and decrease in absolute value in about 7 log points. Still, the two IV are jointly significant with an F test of about 24.

In turn, in columns (3) and (4) we study the first stage for the number of schools in an area. In this case, both IVs are statistically significant and economically relevant. We discuss column (5) below.

[12] The new municipalities are Alto Hospicio created from Iquique in 2005, Alto Bio Bío created from Santa Bárbara in 2005, Hualpén created from Talcahuano in 2005, and Cholchol created from Nueva Imperial in 2004. As a validation check of our identification strategy it is important to notice that these communities are not different from other municipalities in terms of (using values before the actual splitting of the municipality): number of students in public schools, number of public schools, poverty rates, and urbanization rates. Results are available upon request.

Table 3 presents estimates of the effect of student enrollment on educational expenditures at the municipality level. Following the literature (eg., Andrews et al., 2002) we present estimates for three categories of expenditure: central administration of schools, schools payroll, and operational expenditure. We also present estimates including (Panel A) and excluding outliers (Panel B).[13]

We start presenting OLS results, as a benchmark that are probably highly biased. Results imply a positive and statistically significant correlation between the number of students and total expenditure, as expected. The estimated coefficient is in all the cases significantly different from 1 and suggesting strong economies of scale.

The results of the next three columns of both panels of Table 3 present IV estimates using only one IV –dummies for split municipalities. Estimated coefficients of enrollment are, in general, very close to one and, from an statistical point of view, the null hypothesis of equality to 1 cannot be rejected (with p-values above 0.60). The strong difference between IV and OLS estimates imply that probably there is either a lot of measurement error in the enrollment dataset that attenuates OLS estimates or that there is some omitted variable that is positively correlated with enrollment and negatively correlated with ε_{kt}. IV regressions solve this problem and isolates the causal effect of enrollment.

Finally, the last three columns of both panels in Table 3 present IV results using both instrumental variables. The using of two variables allows us to use more information and also apply an over-identification test. Estimated coefficient for enrollment are also very close to 1 (in this case with p-values above 0.45) and in all the cases the over-identification tests suggest the null hypothesis is supported by the data, thus giving some support for our identification strategy.

Therefore, IV estimates imply that per-student expenditures do not depend on the number of students in the public schools of the municipality. As previously discussed, this may be a consequence of the fact that most municipalities in Chile operate with moderate sizes of enrollment.

Regarding the effect of the other variables, results in Table 3 imply that there is no significant correlation between expenditures and poverty (documented also in Gallego and Seebach, 2007). Moreover, the effect of rurality is significant only for operational expenditures, as we explain below.

[13] The municipalities are considered outliers if there is an increase or decrease in the expenditures of at least 50% in absolute value regarding the previous (next) period.

Now, we proceed to studying the relationship between per-student expenditures and the number of municipal schools in operation in the municipality, given that we already showed that there are constant returns to scale. The empirical specification and identification strategies are similar to those used in the previous case. In Table 4, we start presenting in the first three columns, as in the previous case, OLS estimates. Results suggest that there is a significant correlation between number of schools and expenditure per student only in the case of central administration expenditures (remember that this is the category with the lowest share in total expenditure, with a share of about 7% in total expenditure in average), . In the other two cases, the correlation is not different from zero.

In the remaining columns we present IV estimates (columns 3 and 4 of Table 2 present the first stage results). In this case, there is no significant effect of the number of schools on the per-student expenditures. Again, we do not observe an effect of poverty and, in this case, there is a positive effect of the rural variable on the three expenditure categories. Again, the over-identification tests suggest our identification strategy is consistent with the data.

As a whole, results of Tables 3 and 4 imply that there seems to be no causal effect of the scale of operation of the municipal education sector on per-student expenditures of municipal schools. .One policy implication of these results is that, under the current institutional circumstances and levels of enrollment at the municipal level, the consolidation of the administration of public schools into groups of schools from different municipalities should not be expected to have a significant effect on the expenses per pupil and, therefore, on the total expenses.[14]

In the rest of this section, we study the potential effect of the economies of scale *at the school level*. In doing this, we include the average school enrollment in a municipality as a proxy of the scale of its schools. In this case, we use the ratio of enrollment lagged one period as an instrument for the contemporary number of schools in order to avoid a

[14] There may have other (positive or negative) effects on other dimensions that we go beyond the scope of this paper. For instance, Contreras et al. (2007) find that small networks –with between 3 and 5 members—of *privately subsidized* schools in Chile do better than stand-alone and public schools. This contrasts with results in Gallego et al. (2007), where we find that there is no significant correlation between the number of *public* schools in a municipality and tests scores. These results are not incompatible with the results in Contreras et al. (2007) because the average (median) number of schools by municipality is about 18 (15) and, therefore, networks of public schools are probably operating at a level in which there are no effects of the size of the network.

potential division bias (ie. a non-classical form of error in variables, see Borjas, 1980). Column (5) of Table 2 presents the first stage results and Table 5 present the OLS and IV estimates using a panel data set with municipality and year fixed effects. As in previous analyses, we consider the same three expenditure categories and we present estimates including and excluding outliers.

OLS results are significantly lower than IV estimates probably reflecting the presence of mechanical division bias in the estimation. IV results in Table 5 imply that an increase in the average size of the schools in a municipality:

- significantly increases the per-student expenditures in administrative staff. This effect may reflect the fact that more and/or better staff are needed at the municipality level to administrate schools that in average are bigger.
- reduces the per-student expenditures in staff related to schools. This probably captures the basic effect of the economies of scale at the school level in which there is a fixed level of staff needed –a principal, some inspectors and administrative and managerial staff, and even a teacher by each classroom in operation—to have the school running .
- reduces the operational per-student expenditures insofar as the average size of schools increases (although this result is not statistically significant).[15]

These results are mostly consistent with previous results in the literature and also validate the idea of presenting estimates for different expenditure categories. As previously discussed, it is worth noting that most of the municipal expenditure in schools is related to the payroll and operational expenditure and, therefore, when considering total expenditures there is a significant and economically relevant negative impact of average school size on total per-student expenditures.

In relation to the effect of other variables on expenses per student, poverty again appears not to have a significant effect. Rural areas tend to have higher expenditures, even when controlling for average size of schools. Giving that expenditures in teacher wages dominate total per-student expenditures, rural municipalities spend, on average, 25% more per student. In other words, three fourths of the differences of expenses per

[15] Note that the elimination of outliers increases the precision of the estimators without changing the point estimates, validating the idea that these observations just reflect noise in the dependent variable due to measurement error.

pupil in municipal education between rural and urban areas originate from the fact that rural areas have smaller schools.[16]

In sum, the results of this section suggest that, under the current institutional context, (i) the size of the municipal administration (measured both by the number of students and the number of schools) has no significant effect on per-student expenditures and (ii) the average size of the municipal schools does have a significant effect on these expenditures.[17] In the next section, using the expenditure estimates from this section, we study whether rural municipalities could take advantage of economies of scale more efficiently than what they currently do.

4. Why not school consolidation? The role of economic costs

Based on the results obtained in the previous section, we study whether there is room for school consolidation in rural areas and we present evidence on why local governments may be failing to do so. In Chile, we observe rural public schools are usually very small, as reported in Table 1, and, moreover, are becoming smaller due to a decrease in enrollment in rural areas without changing the number of schools. One potential explanation is that, for reasons of efficiency, the consolidation of schools is currently impossible; for example because the schools are located in remote places and, therefore, transportation costs may make prohibitive to consolidate schools. To evaluate this possibility, we carried out a simulation exercise where we estimate the percentage of existing schools that might merge with other schools, subject to the constraint that the

[16] Note that these results that rural areas have higher expenditures do not necessarily imply that differential subsidies are justified in favor of the rural areas. For example, it may be that the differences detrimental to rural areas are due to the inefficiencies thereof.

[17] We do not study the potential impact of school size on test scores. Previous research for Chile suggests that there is a positive correlation between school size and test scores (Mizala and Romaguera, 2000). Estimates in Gallego et al. (2007), which try to control for endogeneity, also find a positive, but small, effect of school enrollment on test scores. These results contrast with some recent causal evidence for the US suggesting that enrollment has a negative impact on test scores (Kuziemko, 2006). However, results for Chile may be explained because the average (median) public elementary school in Chile operates with an enrollment of about 190 (70) students, which is quite small in comparison to enrollment in the US (eg, Kuziemko 2006 reports an average school enrollment in her sample of about 418). The review in Andrews et al. (2002) suggests that the optimal size –from the point of view of maximizing test scores— for elementary schools in the US is between 300 and 500 students. Thus, schools in Chile are probably in the range in which economies of scale are still very relevant.

students should travel at most one hour a day to and from their current school[18] – which, based on an average speed of 30 kilometers (kms) per hour, implies a maximum distance of 15 kms in comparison to their current school.

The choice of a speed of 30 kms per hour represents our base case and is consistent with results in CIPRES (2006) that reports the average speed in rural public transportation ranges from 18 kms per hour in unpaved earth roads, 23 kms per hour in unpaved stone chips roads, to 44 kms per hour in paved gravel roads. A weighted average of the speeds gives an average of about 27 kms per hour.[19] In order to establish the sensitivity of this result, we use two additional estimates considering a speed of 15 kms per hour (and therefore, and a distance of 7.5 kms from current school) as a lower bound and 60 kms per hour (and therefore, a distance of 30 kms) as an upper bound.[20]

Table 6 presents the results of the simulations for our base and two alternative scenarios. We present results for the percentage of school and students subject to potential consolidation, the percentage of municipalities for which some consolidation would be possible, and the average school size after consolidation (as a reference, for the sample for which we have information, average initial school enrollment is 55.2 students). The results suggest that there is a lot of room for the consolidation of schools. In our base case (average speed of 30 kms/hr.) about 53% of the students and 75.4% of the schools are subject to potential consolidation. The percentage of schools is even bigger considering that the consolidated schools tend to be smaller. Even in the most conservative scenario (with an average speed of 15 kms/hr.) one-third of the students and more than half of the schools could be subject to consolidation.

Our results also imply that in more than four fifths of the municipalities at least some schools could be consolidated. Interestingly, this result does not vary significantly under the different scenarios suggesting that in most municipalities there exist schools with low enrollment located close to each other. In terms of average school consolidation at the municipality level, in our case scenario, the average municipality would consolidate

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[18] We do not have GIS information of student homes and, therefore, we have to use current school as a proxy for current student location.

[19] Considering that paved gravel roads, unpaved stone chip roads, and unpaved earth roads represent 24%, 43%, and 36% of total roads in Chile in 2004-2006, respectively (MOP, 2006)..

[20] As a reference, public transport in Santiago and most urban areas in Chile had an average speed in the range from 20 to 30 kilometers per hour in the year 2001 according to the "Encuesta Origen-Destino" of that year. (http://www.sectra.cl/contenido/biblioteca/Documentos/EOD2001.zip)

42.3% of its students, a big number considering that in this scenario in about 15% of the municipalities there is no school consolidation.

Finally, the different scenarios imply that average enrollment in public schools increases in the range between 79.1 and 144.2 students, with a base case of 106.0. Notice that these increases imply that average enrollment would not create schools that are much smaller than the levels that start to create perverse effects for students (which, as previously mentioned, are in the range between 300 and 500 students accordingly to Andrews et al., 2002). These results also imply that the additional infrastructure needed to accommodate more students in each school should not be that significant (this is important for the costs of consolidation, as we discuss below).

Behind the average number we just discussed, there is some heterogeneity as it is evident in Figure 7. This Figure presents the distribution of the proportion of the enrollment that could be consolidated in the different municipalities. As it is noticeable, school consolidation could be as big as 86%, but at the same time about 15% of municipalities would consolidated at most 20% of their students.

What are the implications of this consolidation in terms of the saving of costs? To answer this question, we estimate the average decrease in costs associated to the school consolidation and use the estimated effects from Table 5. Column 1 in Table 7 presents the average results and Figure 8, on the other hand, presents the expected savings of consolidation for the complete distribution of municipalities under our base scenario. These estimates imply that consolidation would produce savings that are between 3.5 and 8.6% of current expenses, with our base scenario having an average decrease in costs of 6.2%. It is important to notice that, even in the most conservative scenario, these are sizeable savings: the median municipal deficit in education in the municipalities included in our sample is 1.6%.

Now, we try to estimate the impacts of some costs of school consolidation that may explain why schools operate at a very low scale. First, as the US experience indicates, the consolidation of schools is associated with higher transportation costs to the new schools (see Gallego et al., 2007 for a detailed revision of the experience in the United States on this issue). To control for this costs, we carried out estimations of the transportation costs that would be required to transport students to their new schools. We considered the average of the expenses in school transport reported by the households included in the Social Protection Survey of the year 2002 (which corresponds to $40 thousand pesos per year per student). Columns (2) and (3) of Table 7 present the results. As expected, cost savings decrease, but they still are positive for a significant share of the municipalities included in the analysis (reported in Column 3): even in the more conservative scenario cost savings are positive for more than 60% of the municipalities and for those having savings, the average decrease in costs is 3.2%. These results imply that transportation costs are not a binding constraint for most of the municipalities included in the analysis

Second, we control for a more direct measure of total costs of sending students to more distant schools. Our previous results just include pecuniary transportation expenditure by households. Using results from Gallego and Hernando (2009), who estimate the utility equivalent of traveling from home to schools, which already includes transportation costs but also includes other non-pecuniary costs,[21] we estimate that total transportation costs is 1.65 times pecuniary transportation costs (which corresponds to about 66 thousand pesos per year per student). Columns (4) and (5) of Table 7 present the results. Results for the extensive margin (column 5) imply that at least about half of the municipalities still have positive savings (in the more conservative scenario). For those municipalities having positive savings, the decrease in costs is still big ranging from 2.7 to 5.5% of the current expenditure level.

Third, we control for potential infrastructure costs associated to the fact that consolidated schools may need to increase infrastructure in a significant way. As presented in Table 6, in our base scenario the average municipality in the sample doubles the size –measured through student enrollment—of its schools. This change includes both the costs associated to the need to increase the capacity of some schools and potential savings associated to renting or selling schools. To evaluate the effect of the additional costs on infrastructure we add, as a cost, the annual equivalent of the average expenditure for improving school infrastructure in Chile in 2005.[22] As we do not have available a good proxy to evaluate the potential value of the schools that now

[21] Such as, for instance, the opportunity cost of time and the insecurity of sending children to schools far from home, among others. Putting it differently, it includes all the utility compensation relate to time spent traveling to schools that households need to receive.

[22] In particular, we consider the "Aporte de Capital" program, which finances school expansions to meet an extended-hours program. The average expenditure of this program is about 60 million pesos by school. We use a social rate of discount of 6% --the rate used in Chile to evaluate public projects, see MIDEPLAN, 2009–to compute the annual equivalent of the expenditure. By construction, this computation is the flow equivalent of doing a net present value calculation.

can be placed in alternative uses, results from the previous calculation should be taken as a lower-bound in terms of savings.

Results are reported in Table 7 –columns 6 and 7. Interestingly, both the number of municipalities having savings after consolidation and the value of the saving decrease but we still observe that more than 40% of municipalities present significant potential for savings (with average savings of between 2.5 and 4.3% of the initial expenditure). Moreover, the municipalities for which we still identify savings have an average deficit of 1.7% of their initial expenditure in education. Therefore, the most conservative calculation derived from our estimators implies that the average deficit would drop to a surplus of at least 0.8%.

In sum, the analysis in this section suggests that still if we control for a number of economic costs related to transportation to the new schools and the construction of new infrastructure in about half of the municipalities, school consolidation is still efficient and, moreover, is equivalent to non-trivial savings for local governments.

5. Why not school consolidation? The role of political factors

We now try to explain the relationship between these results and the institutional setup in which rural schools operate. The distributive implications of school consolidation play a crucial role on mayors' choices. To the extent that the losses associated with closing schools would be concentrated in small groups, the benefits would be spread among the complete population of the municipality. The political economics of narrowly defined special-interest politics tells us that the incentives for the group facing the extra-cost of transport to influence the election than the rest of the population (Persson and Tabellini, 2000).

Thus, even if justified in terms of efficiency gains, incumbent majors might face a political cost when closing a school. First, the greater the additional cost of transport, the greater the incentives this group will have to influence the election. Second, the political clout of the group of voters harmed by the decision will be greater in highly contestable municipalities, where losing support from even a small constituency could imply losing the reelection. Strategic mayors would not be willing to capture the efficiency gains from an optimal size allocation if they want to avoid this political cost. However, it has to be stressed out that they would only be able to do this if they face soft budgets, i.e., that have access to alternative funds that allow them to cope with the inefficiencies.

Our conjecture is, therefore, that closing schools is easier to be done in municipalities where i) transport costs are lower; ii) majors face less competitions; and iii) municipalities have access to alternative funds. Indeed, the latter two effects should interact: in politically contestable municipalities, where municipalities have access to alternative funds, the political concentration effect should be stronger.

In order to test this hypothesis we estimate the following equation:

$$PC_k = \alpha + \beta HH_k + V_k \chi + HH_k \cdot V_k \gamma + X'_k \delta + \mu_k , \qquad (2)$$

where *k* refers to municipality, *PC* is the share of rural students that could be reallocated accordingly to our simulations, *HH* is a Herfindahl-Hirschman index of political concentration in local elections (an increase implies a more concentrated electorate), *V* is the share of votes going to the center of left pro-government coalition (and therefore having better access to funds from the central government, as shown by Gallego, 2006), *X* is a vector of controls (including transportation and infrastructure cost of the reallocation of students), and μ_c is a random shock.

We use two different dependent variables: (i) the share of the inefficiency –i.e., the percentage of students by municipality that could be consolidated in order to reduce costs—accordingly to our computations including transportation costs and (ii) the share of the inefficiency including *both* transportation and infrastructure costs. We compute electoral outcomes using the 2000 local elections to avoid potential endogenous causality (recall that our simulation for the reallocation of students was implemented for 2005). We compute the Herfindahl-Hirschman index considering four political groups (the opposition center of right coalition, the pro-government center of left coalition, the Communist-Green coalition, and all independent groups together).

Table 8 presents results of estimating equation (2). Results support our hypothesis: the effect of political concentration becomes more negative as the proportion of votes going to the government coalition increases, as expected. The other variables present the expected signs for transportation and infrastructures costs of student consolidation, which imply that the higher the cost associated to consolidation, the lower the consolidation process.

Moreover, the results imply that the effect of political competition on the proportion of students subject to consolidation is not only statistically significant but also economically relevant. For instance, for a municipality with a pro-government support of 52% (close to the average pro-government support in our sample), a one-standard deviation increase in the share of support of the government coalition increases the absolute value of the effect of political concentration by between 44 and 73% standard deviations of the share of students subject to consolidation.

6. Conclusions

We show that per-student expenditures in municipal schools does not depend on either the total enrollment in public schools in municipalities or the number of municipal schools in the municipality. In turn, our results suggest the existence of economies of scale at the level of the school: close to 75% of the difference observed in the expenses per pupil (close to 27% higher in rural areas than urban areas, which is the equivalent to about US$560 per year per pupil, or 35% of the yearly per student voucher) is explained by differences in average school size. Interestingly, a simulation exercise indicates that about half of the municipal enrollment attending primary rural schools might be concentrated into larger schools, producing significant savings. These results are mostly robust to controls for transportation and infrastructure costs and to using alternative assumptions on the average speed in rural roads.

These results imply that currently there are a lot of schools that operate at extremely inefficient operation levels even when the schools belong to identical education suppliers. We present evidence that at least part of this phenomenon is related to political economy factors. The closing of schools constitutes significant political costs for the mayors, especially when they have potential access to non-voucher funds. Thus, municipalities having low political competition levels and access to alternative sources of funding (i.e. soft budget constraints) tend to have more efficient school sizes because probably they do not face significant political costs of closing schools.

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Table 1: School size, by type of schools and area

		Number of Schools	**Enrollment**	**Teachers**	**Students per School**	**Teachers per School**
	RUR	3,623	273,553	17,159	76	5
Municipal schools	URB	2,475	1,492,563	66,926	603	27
	TOT	6,098	1,766,116	84,085	290	14
	RUR	918	84,431	4,379	92	5
Voucher shools	URB	3,712	1,493,021	58,904	402	16
	TOT	4,630	1,577,452	63,283	341	14
	RUR	4,541	357,984	21,538	79	5
All schools	URB	6,187	2,985,584	125,830	482	20
	TOT	10,728	3,343,568	147,368	312	14

Source: Chilean Ministry of Education, National Statistics 2005. RUR = rural schools, URB = urban schools, TOT = all schools.

Table 2: Estimation of Economies of Scale. First Stage

Dependent variable:	**Log Number of Students**		**Log Number of Schools**		**Log Enrollment per School**
	(1)	(2)	(3)	(4)	(5)
Dummy for drop in population above 3%		-0.095		-0.255***	
		(0.081)		(0.069)	
Dummy for split area	-0.448***	-0.376***	-0.800***	-0.605***	
	(0.065)	(0.090)	(0.056)	(0.077)	
Lagged Log Enrollment per School					0.507***
					(0.030)
Rural	-0.752***	-0.753***	0.644***	0.639***	-0.708***
	(0.054)	(0.054)	(0.047)	(0.047)	(0.047)
Poverty	-0.158	-0.146	0.526***	0.566***	-0.285**
	(0.146)	(0.146)	(0.141)	(0.141)	(0.112)
Ln Poverty Rate	-0.010	-0.012	-0.118***	-0.126***	0.024
	(0.032)	(0.032)	(0.032)	(0.032)	(0.024)
Observations	1,305	1,305	1,274	1,274	1,185
Number of municipalities	300	300	300	300	300
F test of excluded instruments	47.41	24.40	47.41	24.40	24.40
R^2	0.224	0.225	0.325	0.334	0.491

Notes: Regressions include municipality and time fixed effects. Standard errors are in parenthesis. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 3: IV Estimation of Economies of Scale: Expenditure and Enrollment in Municipality

Dependent variable	Ln Expenditure Adm. Schools	Ln Schools Payroll	Ln Operational Expenditure	Ln Expenditure Adm. Schools	Ln Schools Payroll	Ln Operational Expenditure	Ln Expenditure Adm. Schools	Ln Schools Payroll	Ln Operational Expenditure
				Panel A : Full Sample					
Ln Enrollment	0.237**	0.330***	0.456***	0.960*	0.909**	0.991**	0.892*	0.853**	0.987**
	(0.103)	(0.075)	(0.095)	(0.496)	(0.365)	(0.453)	(0.487)	(0.358)	(0.447)
Rural	-0.049	-0.102	0.520***	0.457	0.302	0.893**	0.409	0.263	0.890**
	(0.191)	(0.140)	(0.176)	(0.391)	(0.287)	(0.357)	(0.385)	(0.283)	(0.352)
Ln Poverty Rate	0.111	0.121	0.116	0.113	0.120	0.115	0.113	0.120	0.115
	(0.106)	(0.077)	(0.097)	(0.109)	(0.079)	(0.098)	(0.108)	(0.079)	(0.098)
Poverty	-0.477	-0.542	-0.375	-0.338	-0.422	-0.264	-0.351	-0.434	-0.265
	(0.488)	(0.355)	(0.446)	(0.506)	(0.371)	(0.461)	(0.504)	(0.369)	(0.460)
Observations	1,309	1,355	1,355	1,308	1,355	1,355	1,308	1,355	1,355
R^2	0.178	0.295	0.186						
Number of municipalities	300	308	308	299	308	308	299	308	308
Chi-Test: Ln Enrollment=1	0	0	0	0.936	0.803	0.985	0.825	0.683	0.976
Over-identification test (*p*-value)							0.411	0.366	0.954
				Panel B : Without Outliers					
Ln Enrollment	0.267***	0.339***	0.387***	0.936**	0.859***	1.033***	0.864**	0.804***	1.033***
	(0.090)	(0.056)	(0.081)	(0.433)	(0.273)	(0.390)	(0.425)	(0.267)	(0.385)
Rural	-0.027	-0.035	0.367**	0.445	0.331	0.821***	0.394	0.292	0.821***
	(0.168)	(0.104)	(0.151)	(0.344)	(0.217)	(0.310)	(0.338)	(0.213)	(0.307)
Ln Poverty Rate	0.095	0.086	0.075	0.097	0.087	0.076	0.097	0.087	0.076
	(0.093)	(0.058)	(0.083)	(0.095)	(0.060)	(0.086)	(0.094)	(0.059)	(0.086)
Poverty	-0.476	-0.466*	-0.277	-0.347	-0.366	-0.152	-0.361	-0.377	-0.152
	(0.426)	(0.264)	(0.382)	(0.443)	(0.279)	(0.399)	(0.440)	(0.277)	(0.399)
Observations	1,305	1,305	1,305	1,304	1,304	1,304	1,304	1,304	1,304
R^2	0.208	0.420	0.263						
Number of municipalities	300	300	300	299	299	299	299	299	299
Chi-Test: Ln Enrollment=1	0	0	0	0.883	0.605	0.933	0.749	0.462	0.932
Over-identification test (*p*-value)							0.321	0.226	0.999
Estimation Technique	OLS	OLS	OLS	IV(1)	IV(1)	IV(1)	IV(2)	IV(2)	IV(2)

Notes: IV(1): IV estimation using 1 instrument. IV(2): IV estimation using 2 instruments. Regressions include municipality and time fixed effects. Standard errors are in parenthesis. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 4: IV Estimation of Economies of Scale: Expenditures per Student and Number of Schools, Second Stage

	Ln Per-student Exp. in Central Adm. of Schools	Ln Per-student Schools Payroll	Ln Per-student Operational Expenditure	Ln Per-student Exp. in Central Adm. of Schools	Ln Per-student Schools Payroll	Ln Per-student Operational Expenditure	Ln Per-student Exp. in Central Adm. of Schools	Ln Per-student Schools Payroll	Ln Per-student Operational Expenditure
	Panel A : Full Sample								
Ln Schools	-0.269**	0.068	0.105	-0.011	-0.050	-0.014	-0.065	-0.095	-0.018
	(0.115)	(0.084)	(0.102)	(0.276)	(0.203)	(0.248)	(0.267)	(0.197)	(0.240)
Rural	0.645***	0.305**	0.856***	0.461*	0.388**	0.941***	0.499*	0.420**	0.944***
	(0.199)	(0.146)	(0.179)	(0.268)	(0.196)	(0.240)	(0.263)	(0.193)	(0.236)
Ln Poverty Rate	0.054	0.133	0.142	0.079	0.120	0.130	0.074	0.116	0.129
	(0.126)	(0.092)	(0.113)	(0.129)	(0.094)	(0.115)	(0.128)	(0.094)	(0.115)
Poverty	-0.113	-0.527	-0.438	-0.225	-0.474	-0.385	-0.202	-0.454	-0.383
	(0.558)	(0.408)	(0.500)	(0.567)	(0.415)	(0.508)	(0.566)	(0.415)	(0.507)
Observations	1,278	1,324	1,324	1,276	1,323	1,323	1,276	1,323	1,323
R^2	0.187	0.283	0.189						
Number of municipalities	300	308	308	298	307	307	298	307	307
Over-identification test (p-value)							0.430	0.378	0.945
	Panel B : Without Outliers								
Ln Schools	-0.245**	0.057	0.062	-0.025	-0.079	0.013	-0.082	-0.123	0.013
	(0.100)	(0.063)	(0.089)	(0.240)	(0.152)	(0.213)	(0.233)	(0.147)	(0.206)
Rural	0.637***	0.378***	0.781***	0.477**	0.478***	0.817***	0.518**	0.510***	0.817***
	(0.175)	(0.111)	(0.156)	(0.237)	(0.149)	(0.210)	(0.232)	(0.147)	(0.206)
Ln Poverty Rate	0.032	0.085	0.078	0.054	0.071	0.073	0.048	0.067	0.073
	(0.110)	(0.070)	(0.098)	(0.112)	(0.071)	(0.099)	(0.112)	(0.071)	(0.099)
Poverty	-0.097	-0.407	-0.255	-0.195	-0.346	-0.233	-0.170	-0.327	-0.232
	(0.486)	(0.307)	(0.432)	(0.495)	(0.312)	(0.439)	(0.493)	(0.312)	(0.438)
Observations	1,274	1,274	1,274	1,272	1,272	1,272	1,272	1,272	1,272
R^2	0.215	0.400	0.265						
Number of municipalities	300	300	300	298	298	298	298	298	298
Over-identification test (p-value)							0.341	0.246	0.993
Estimation Technique	OLS	OLS	OLS	IV(1)	IV(1)	IV(1)	IV(2)	IV(2)	IV(2)

Notes: IV(1): IV estimation using 1 instrument. IV(2): IV estimation using 2 instruments. Regressions include municipality and time fixed effects. Standard errors are in parenthesis. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: IV Estimation of Economies of Scale: Expenditures per Student and Average School Enrollment

	Ln Per-student Exp. in Central Adm. of Schools	**Ln Per-student Schools Payroll**	**Ln Per-student Operational Expenditure**	**Ln Per-student Exp. in Central Adm. of Schools**	**Ln Per-student Schools Payroll**	**Ln Per-student Operational Expenditure**	**Ln Per-student Exp. in Central Adm. of Schools**	**Ln Per-student Schools Payroll**	**Ln Per-student Operational Expenditure**
Ln (Enrollment/Schools)	-0.387***	-0.510***	-0.438***	0.192	-0.243**	-0.166	0.283***	-0.154***	-0.112
	(0.089)	(0.063)	(0.079)	(0.170)	(0.113)	(0.139)	(0.095)	(0.031)	(0.092)
Rural	-0.095	-0.363**	0.316	0.973**	-0.096	1.015***	1.183***	0.166**	0.938***
	(0.220)	(0.158)	(0.196)	(0.390)	(0.260)	(0.320)	(0.220)	(0.072)	(0.214)
Ln Poverty	0.116	0.178**	0.176	0.064	0.101	0.142	-0.000	0.024	-0.013
	(0.125)	(0.089)	(0.111)	(0.126)	(0.086)	(0.106)	(0.071)	(0.023)	(0.069)
Poverty	-0.456	-0.810**	-0.661	-0.123	-0.329	-0.300	-0.026	-0.144	0.161
	(0.554)	(0.396)	(0.493)	(0.588)	(0.400)	(0.493)	(0.328)	(0.107)	(0.319)
Observations	1,278	1,324	1,324	1,160	1,206	1,206	1,137	1,137	1,137
R^2	0.129	0.229	0.146						
Number of municipalities	300	308	308	298	307	307	294	294	294
Estimation Technique	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV
Sample	Full	Full	Full	Full	Full	Full	Without Outliers	Without Outliers	Without Outliers

Notes: Regressions include municipality and time fixed effects. Standard errors are in parenthesis. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Rural Schools Consolidation: Simulation Results

Outcome	Students subject to consolidation (% students)	Schools subject to consolidation (% schools)	Municipalities with positive potential consolidation	Average share of students subject to consolidation (% students, municipality level)	Final average enrollment (municipality level)
Scenario:					
Speed of 15 km/hr	33.2%	53.4%	80.1%	25.9%	79.1
Speed of 30 km/hr	52.9%	75.4%	86.4%	42.3%	106.0
Speed of 45 km/hr	63.9%	86.1%	89.5%	52.9%	144.2

Notes: Author's computations. Initial average enrollment = 55.2.

Table 7: Cost Savings and Urban Schools Consolidation: Simulation Results

Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Scenario:							
Speed of 15 km/hr	3.5%	3.2%	62.0%	2.7%	48.6%	2.5%	43.1%
Speed of 30 km/hr	6.2%	4.7%	70.2%	4.2%	51.4%	3.7%	44.9%
Speed of 45 km/hr	8.6%	6.4%	76.8%	5.5%	58.3%	4.3%	50.0%

Notes: Author's computations. The outcome in each column is:

(1) Cost savings (% initial municipality expenditure)

(2) Cost savings net of pecuniary transportation costs (if positive savings)

(3) % of municipalities with savings from consolidation according to (2)

(4) Cost savings net of total transportation costs (if positive savings)

(5) % of municipalities with savings from consolidation according to (4)

(6) Cost savings net of total transportation and infraestructure costs (if positive savings)

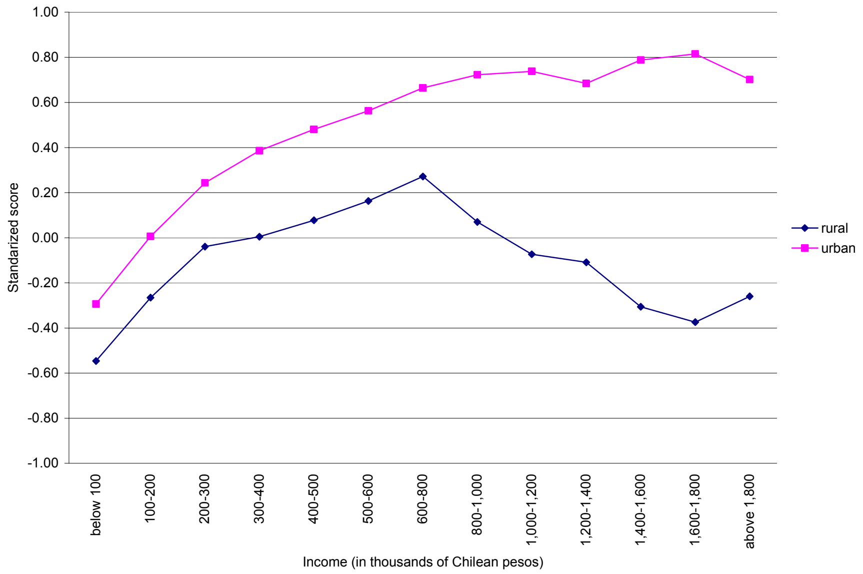
(7) % of municipalities with savings from consolidation according to (6)

Table 8: Determinants of School Size Inefficiency

Dependent variable:	% of students potentially subject to consolidation considering transportation costs	% of students potentially subject to consolidation considering transportation and infraestructure costs
	(1)	(2)
Log of Index of Political Concentration (HH)	0.026	-0.073
	(0.064)	(0.109)
Share of Pro-Government Coalition (PG)	0.158	0.175*
	(0.141)	(0.086)
HH × PG	-1.466**	-0.883**
	(0.561)	(0.041)
Transportation costs	0.012***	0.006***
	(0.001)	(0.001)
Infraestructure costs	0.005***	0.009***
	(0.001)	(0.003)
Number of observations	270	270
R^2	0.490	0.179

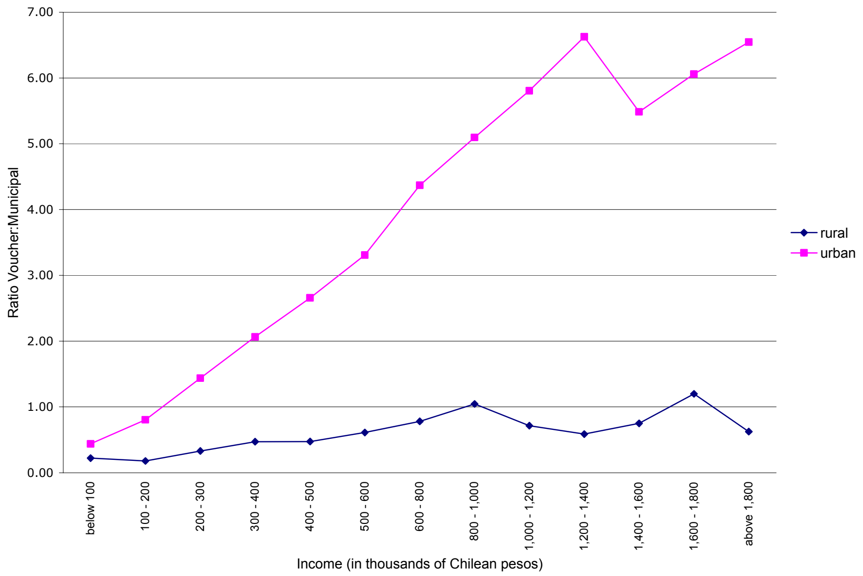
Notes: Standard errors clustered at the region level are in parenthesis. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Standardized fourth-grade mathematics SIMCE, year 2005, per household income group and area



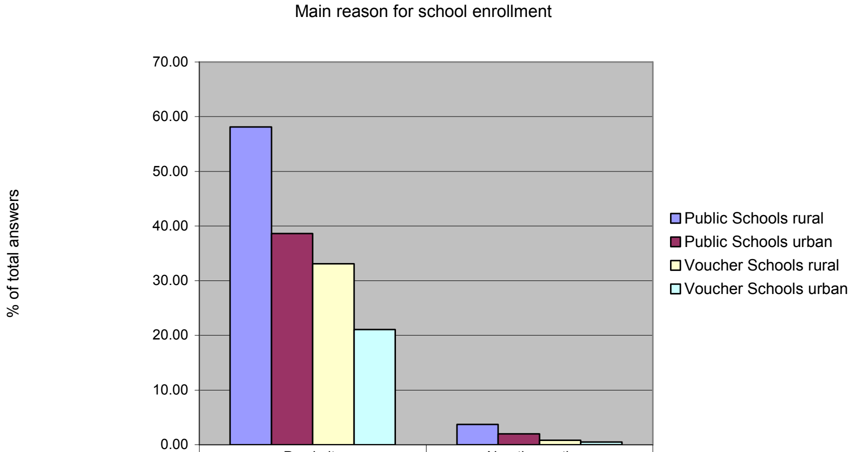
Source: Chilean Ministry of Education, SIMCE 2005 4th grade.

Figure 2: Voucher schools entry by household income and area



Source: Chilean Ministry of Education.

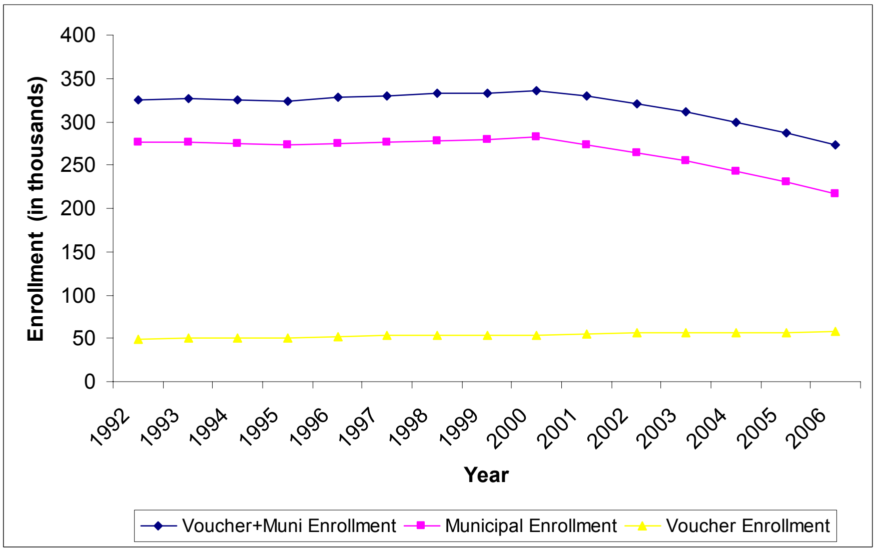
Figure 3: Main reason for enrollment in schools, by school type and area



	Proximity	No other options
Public Schools rural	58.12	3.72
Public Schools urban	38.63	2.00
Voucher Schools rural	33.09	0.80
Voucher Schools urban	21.06	0.50

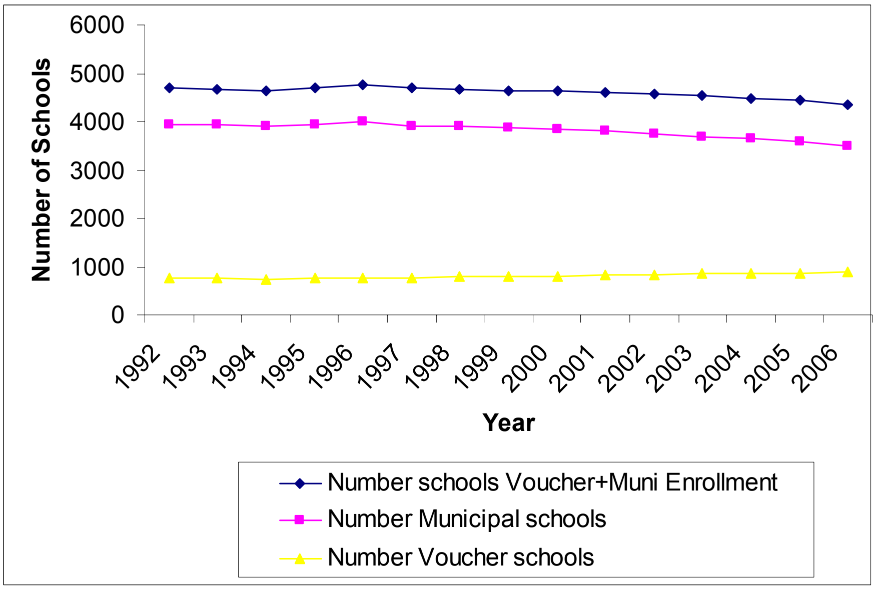
Source: Chilean Ministry of Education, SIMCE 2005.

Figure 4: Rural enrollment , by school type



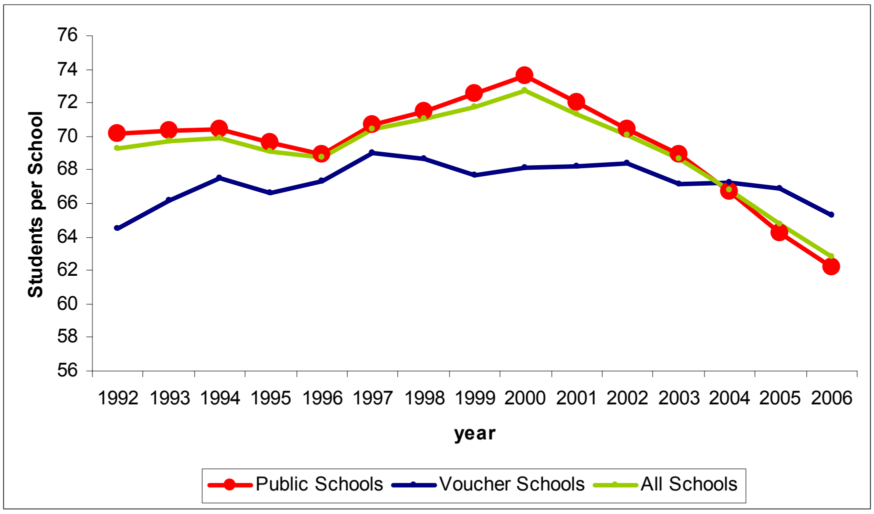
Source: Chilean Ministry of Education, National Statistics 1992-2006

Figure 5: Number of rural schools, by school type



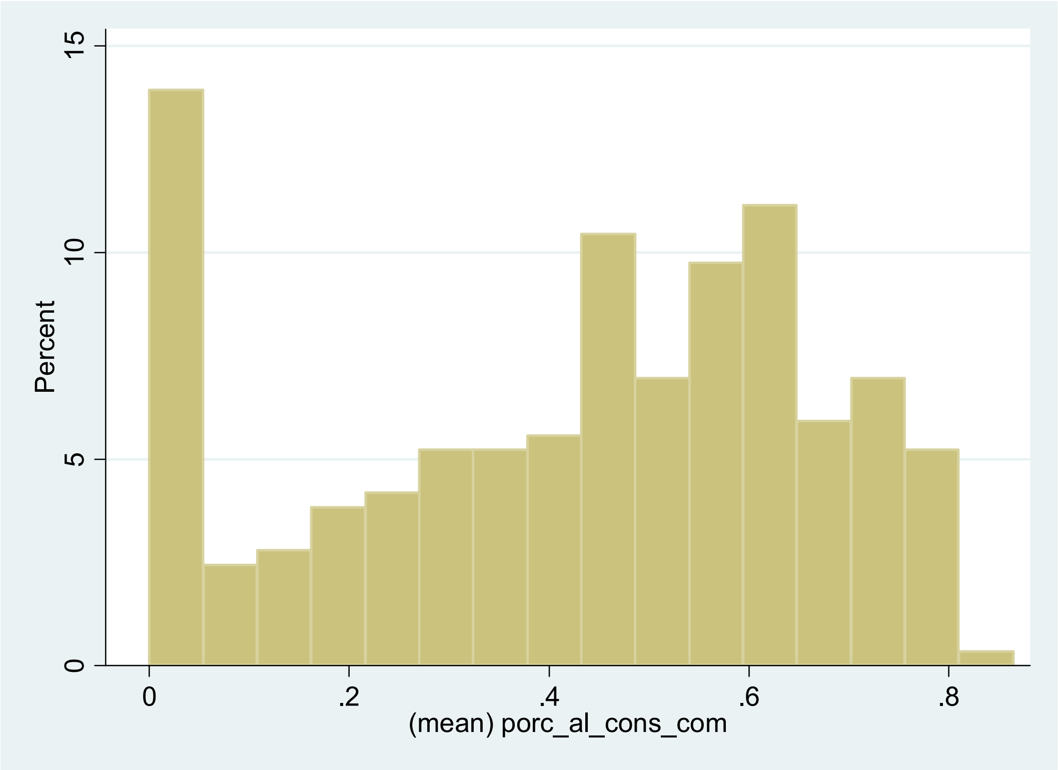
Source: Chilean Ministry of Education, National Statistics 1992-2006

Figure 6: Enrollment per school, by school type



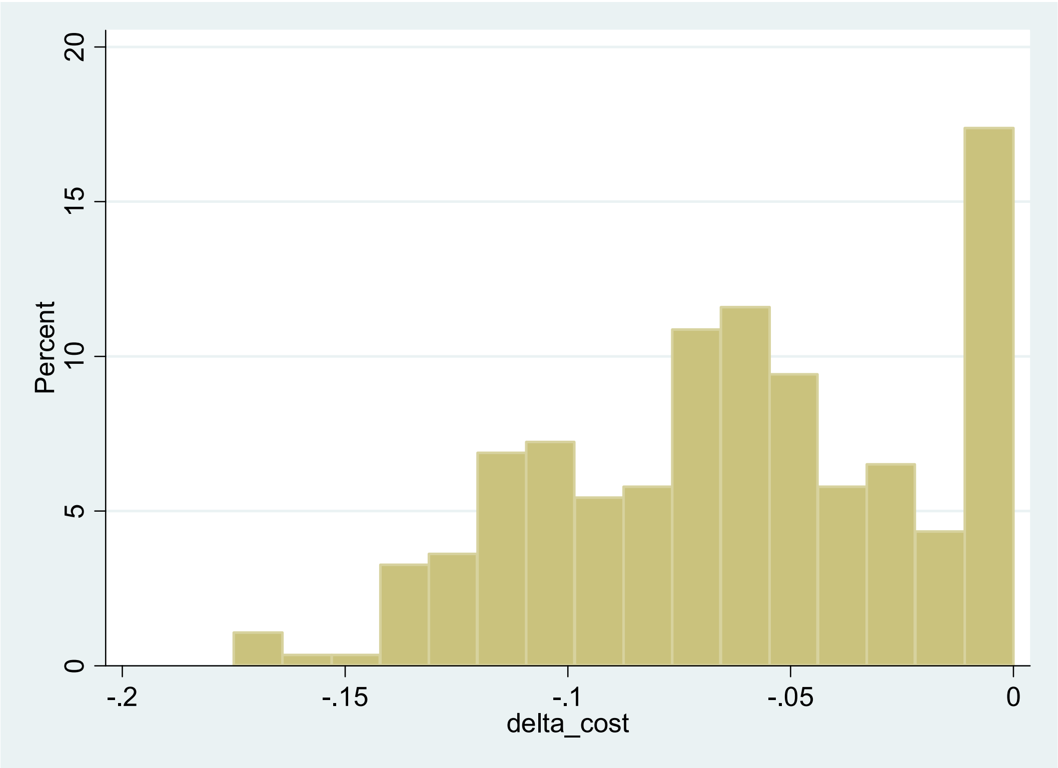
Source: Chilean Ministry of Education, National Statistics 1992-2006

Figure 7: Simulation Results: Percent of students subject to school consolidation, by municipality



Source: Authors' elaboration.

Figure 8: Simulation Results: Percent of Potential Savings due to School Consolidation



Source: Authors' elaboration.

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