

KEYWORDS

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Chile: academic performance and educational management under a rigid employment regime

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Working with census information on standardized academic performance tests and using different estimation techniques, this article analyses sociodemographic and management factors affecting the performance of Chile's municipal schools. The evidence suggests that the system's lack of flexibility, particularly where teacher dismissal is concerned, is an important factor but not the main cause of poor academic performance. Conversely, the differences in academic performance between municipal schools that can be attributed to management are almost twice the standard deviation of the System for Measuring the Quality of Education (SIMCE) performance test and 20 times the increment ascribed to the "complete school day" initiative, which costs the equivalent of half a point of gross domestic product (GDP).

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I

Introduction

Primary education performs poorly in Chile. This is particularly striking because the country has not only been channelling significant resources into education, but has also implemented major reforms in the sector. Despite all these efforts, performance indicators have remained virtually unchanged.

A question that is becoming increasingly vital all over the world, but particularly in Latin America, is whether differences in educational performance are due to the different institutional mechanisms governing schools and whether decentralization and certain forms of privatization may account for them. In Chile, the first country to implement major reforms, municipal schools take in more than 50% of primary students but obtain substantially lower scores than other types of school. A recurrent explanation for the

underperformance of these schools is that, as well as taking in more vulnerable students, they are subject to a very rigid regulatory framework regarding teacher dismissal and salaries.

In this study we analyse the importance of the Teaching Statute (*Estatuto Docente*) and other factors in addition to that legislation, which lays down the principles regulating the operations of the education sector in municipal districts. The effects of management on performance are a particular interest of this paper, which is divided into four sections. Section II briefly reviews the literature and describes the institutional characteristics of municipal schools. Section III estimates measures of municipal school performance and introduces a set of management variables. Section IV concludes with recommendations.

II

The Chilean education system

1. The institutional framework

Until the late 1970s, the Ministry of Education was responsible for financing public education in Chile, regulating curricular content and investing in infrastructure. Negotiations with teachers were centralized, something that was deemed to be a source of conflict and regional inequity. The reform of 1980 sought to change this situation, reflected as it was in the low quality of education, high repetition and drop-out rates, low investment and a lack of incentives (Hanushek, 1998).

One of the main tools of the reform was the introduction of incentives, which involved market

elements, targeted expenditure and, in particular, certain forms of privatization and decentralization. Three categories of schools were created as a result: (i) municipal schools, administered by the municipalities and financed by a government subsidy based on attendance per student and municipal contributions; (ii) subsidized private schools, also financed by the State with the same attendance subsidy per student and, since 1992, by additional contributions made within certain limits by parents; and (iii) fee-paying private schools, financed exclusively from parents' contributions. A detailed description can be found in Mizala and Romaguera (1998).¹

In 1988, the System for Measuring the Quality of Education (SIMCE) test was created. It consists of four parts that measure knowledge of content from

□ The authors are grateful to the Ministry of Education for the SIMCE data, to the National Fund for Scientific and Technological Development (FONDECYT) for its financing of project 1,095,176, Centre for Research on Educational Policy and Practice (CIE01-CONICYT) and to Rómulo Chumacero. They also wish to express their special thanks to the CEPAL Review referee for his comments and suggestions.

¹ A minority of municipal schools operate under municipal corporations (*corporaciones municipales*), which have some degree of financial autonomy and greater latitude to determine salaries and the employment regime of workers in educational management support roles.

the present and the past: language and communication (language), mathematical studies (mathematics), study and understanding of nature (science) and study and understanding of society (social studies). The test is taken at the end of the school year. While widely accepted, the SIMCE, like most other standardized tests, has come in for considerable criticism (see, for example, Eyzaguirre and Fontaine, 1999).

The results of this standardized test have been made public since 1995 to give parents a tool with which to judge the performance of their children and to foster competition between schools. This test has been the main instrument for measuring the quality of education in the country and the authors have used it as their primary information source. In 1998, it was modified and standardized so that it could be used to follow up school performance. The new test has an open-ended scale that measures student abilities (cognitive skills). It uses item response theory (IRT), a procedure linking students' scores to aptitudes that is applied in most international tests of academic attainment, such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA). Thus, even if two students answer the same number of questions correctly, their scores could differ as different levels of aptitude are being measured. The SIMCE 2000 scores, with a mean of 250 points and a standard deviation of 50 points, serve as a benchmark against which eighth grade results (including the 2004 results used in this study) are compared.

In 1991, Chile enacted the Teaching Statute, which provided for centralized pay bargaining and protected teachers at municipal schools from dismissal, and thus made the system even more inflexible (Tokman, 2004; Beyer, 2001). In 1996, the National System for the Evaluation of School Performance (SNED) was introduced. This programme requires schools to provide information on educational processes and results, and establishes incentives for teachers (Mizala and Romaguera, 1999 and 2000a). In 2007, the government finished implementing the complete school day initiative, increasing the primary school week from 30 to 38 hours and the secondary school week from 36 to 42 hours. This initiative was based on a curricular reform which changed study plans and programmes and laid down minimum compulsory syllabuses.

Regarding the consequences of the reforms, they are generally agreed to have increased coverage and reduced repetition rates. However, most analysts also

find that education quality is low, that educational results are highly stratified and that the level of instruction is unsatisfactory by international standards (Heyneman, 1991 and 2004; Bellei and González, 2002; Brunner, 2005; Valenzuela, 2008; Paredes and Ruiz, 2009). The Third International Mathematics and Science Study-Repeat (TIMSS-R), for instance, shows that in 1999 Chilean eighth grade students ranked 35 among 38 countries in mathematics and science, while in 2003 they ranked 40 out of 45 in mathematics and 37 out of 45 in science. Chile even ranks below countries with lower per capita gross domestic product (GDP) and investment in education, such as Jordan and Malaysia. Furthermore, the 2003 TIMSS-R showed that the gap in quality between the low- and high-income sectors had increased between 1990 and 2003 from 120 to 142 points on a scale having a mean of 500 and a standard deviation of 100. Tokman (2004) arrives at similar conclusions on the basis of other international tests, namely PISA, the International Adult Literacy Survey (IALS) (Hanushek and Kimko, 2000) and TIMSS.

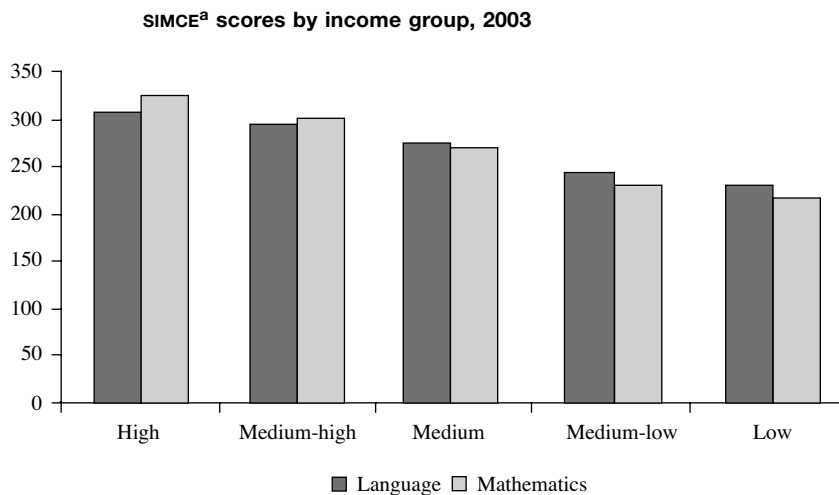
Besides the relative underperformance of low-income groups, Chilean students also perform badly on average. Figure 1 shows these two situations. On the standardized SIMCE scale, a score below 226 means that the student has not even assimilated the content of the courses preceding the year in which he or she sat the examination. A score of between 227 and 267 shows that the student has partial mastery of the preceding courses but has not assimilated the content of the course currently being taken. This is especially important considering that the SIMCE is taken at the end of the year.

There is a large literature on the consequences of these reforms. The broad consensus is that coverage has increased substantially over the last 15 years but that the reforms have done little to reduce the educational gap between households by income level or to improve the absolute quality of education. There has been less analysis of the role of school municipalities and of the effects of the Teaching Statute on academic performance (Paredes and Lizama, 2006).

2. Assessing municipal education

Most studies on Chile have treated socio-economic factors as determinants of educational outcomes (Mizala and Romaguera, 2000a and 2002; Gallego, 2002; Sapelli and Vial, 2002; García and Paredes, 2009; Chumacero and Paredes, 2008). In line with the

FIGURE 1



Source: J.J. Brunner, “Experiencia internacional y desafíos nacionales de gestión escolar”, Santiago, Chile, Fundación Chile, 2005.

^a System for Measuring the Quality of Education.

international literature, they find that socio-economic variables significantly affect academic results. Thus, any analysis of education quality must consider the characteristics of students.²

Table 1 shows the results of two regressions employing two different estimation techniques, ordinary least squares (OLS) and hierarchical linear modelling (HLM). The use of a multilevel model that takes account of influences common to students at the same school reflects the possibility that observations may not be independent (Steenbergen and Bradford, 2002). In this model, academic attainment is represented by Y_{ij} and depends on a group of socio-demographic factors X (see equation 1) that specify level 1 (student) of the mixed effects model:

$$Y_{ij} = \beta_{0j} + \beta_1 X_{ij} + \varepsilon_{ij} \quad (1)$$

The vector X_{ij} contains a series of student characteristics (sex, educational level of mother and family income). The error ε_{ij} is assumed to be independent and have an identical distribution $N(0, \sigma_e^2)$. Level 2 (school) is represented by equation (2):

$$\beta_{0j} = \gamma_{00} + \gamma_{01} C_j + \eta_{0j} \quad (2)$$

² For other studies, see Sapelli and Vial, 2002; Sapelli, 2003; Pavez, 2004; García and Paredes, 2009.

where j indicates municipalities. The vector C_j contains school characteristics (e.g., rural location, school vulnerability index, average family incomes and average educational level of students' mothers). The error η_{0j} , which follows a distribution $N(0, \sigma_0^2)$, represents the portion of intercept that is not explained by the predictors at the school level and is supposedly independent of the predictors at the student level.

Both consider family income, parents' schooling, gender, location (urban) and institutional dummies associated with the two types of municipal schools (“department” and “corporation”), taking subsidized private schools and direct school expenditure (question put to parents in the SIMCE questionnaire) as the base.³ Reflecting the findings of most studies, table 1 shows that all these variables have a significant impact on performance as measured by the SIMCE test using both OLS and HLM. Likewise, as in a number of other studies, both estimations show municipal schools performing more poorly than subsidized private schools, a difference that is particularly large in the case of municipal corporations.

³ At the beginning of the reform, a small number of municipalities chose to have a municipal corporation (*corporación municipal*) to manage schools. These corporations have a board and enjoy greater autonomy than a municipal department (*dirección municipal*). After a few years, the government decided not to give municipalities a choice of administration method. Most analysts suggest that the “random” way this option was introduced and withdrawn did not bias any student performance results.

TABLE 1

Fourth grade students: academic performance
(Average of three tests)

	OLS	HLM
Constant	201.50 (414.43) ^a	208.92 (277.91) ^a
Income (00.000)	0.35 (32.94) ^a	0.21 (19.69) ^a
Income 2 (00.000)	-0.0000013 (21.92) ^a	-0.0000008 (13.05) ^a
Gender	0.30 (1.55)	1.01 (5.38) ^a
Urban	-1.08 (3.40) ^a	-2.54 (4.16) ^a
Private fee-paying	7.70 (13.30) ^a	19.5 (16.83) ^a
Municipal	-7.30 (30.21) ^a	5.14 (8.41) ^a
Municipal corporation	-11.67 (41.56) ^a	-9.45 (11.80) ^a
Father's schooling	1.51 (44.46) ^a	1.18 (36.29) ^a
Mother's schooling	3.07 (85.39) ^a	2.37 (67.65) ^a
Expenditure (00.000)	0.20 (4.38) ^a	-0.55 (10.24) ^a
Observations	220 212	220 212
R ²	0.20	0.19
Number of groups		7 313

Source: estimates based on *simce* results, Ministry of Education.
N.B.: The robust t-statistic is given in parentheses.

^a Significant at 1%.

There is a great deal of debate over this difference, however. The gap between private and municipal schools as estimated in table 1 requires more thorough analysis since, for example, the choice of school type is endogenous, biasing the estimates.⁴ Increasing the number of controls reduces the bias against municipal schools. In fact, controls such as “fixed school effects” and “selection variables”, for instance, could make this difference negligible (see, for example, Bellei, 2005; Contreras, Bustos and Sepúlveda, 2007).

Fortunately, one clear advantage of this study is that it is only concerned with municipal schools and therefore does not have to deal with the private/municipal controversy. To answer the main question of this paper, we can work exclusively with municipal schools. This does not mean we cannot form some estimate of how restrictive the Teaching Statute is and what its effects on academic performance are, since the same employment regime affects each municipality differently depending on its exposure to the more restrictive aspects of the law. Thus, for instance, we can expect the effects to be more serious for municipalities with older teachers, since the Teaching Statute imposes greater conditions with age, and the restrictions will particularly affect those requiring greater flexibility.

⁴ See Hsieh and Urquiola (2006); Anand, Mizala and Repetto (2006); McEwan (2001); Contreras (2002); Sapelli and Vial (2002).

III

Evaluating municipalities

1. Socio-economic and environmental variables

As already stated, a clear advantage of our procedure is that it does not require us to confront the private/public controversy. We can focus our work by estimating educational performance equations for municipal schools only, and because the conclusions do not differ we shall report only the results for the OLS estimations.

We first estimated a model incorporating the same type of sociodemographic variables as are used in table 1, but for municipal schools only. In view of what is done in most studies, we included the school vulnerability index estimated by the Ministry of Education, average schooling and average income in the municipal district as a sort of control for social capital. We then considered a set of variables associated with budgetary constraints affecting education in each municipal district. This was done because differences in municipal resources are very significant in Chile, with budgets depending heavily on the taxes levied by each municipality (chiefly property and motor vehicle taxes). The variable we used for this purpose was the expenditure per student notified by municipalities, which does not differentiate by funding source.

We also considered variables reflecting the basis of the education function that have been justified by different studies, such as the teacher-student ratio, the number of municipal schools within the municipal district, the number of registered students and coverage, as measures of scale.⁵ Furthermore, we considered the length of tenure of teaching staff as measured by the payment of *bienios*, a teaching salary component based on experience (measured in two-year units) which is included in the salaries and wages account. This latter variable, which is essentially exogenous to each municipal district, reflects the extent to which the Teaching Statute affects salaries, since tenure is associated with different capabilities but also entails

⁵ Coverage, which is notified by the municipalities, does not reflect the percentage of young people in the municipal district who are studying, since some districts are net exporters and others net importers. Thus, the variable is more of a scale proxy than a coverage variable as such. We are grateful to the CEPAL Review referee for bringing this point to our attention.

greater constraints and creates an obstacle to dismissal. Lastly, we included variables reflecting the distribution of expenditure between personnel, operating costs and investment.

Since the results of the regressions for each test are quite consistent, in table 2 we only report the results for average performance. From this table we can infer that, taken as a whole, the model is appropriate but has considerably less explanatory power than one covering all students. The relatively low R^2 shows the huge dispersion between municipalities. For the whole sample, in any event, the sociodemographic variables have a significant impact on the scores obtained by students, a result that is consistent with the different studies carried out in Chile and internationally.⁶

Regarding municipal organization, the findings are quite striking. The results in the first column show that municipal schools run by municipal corporations do worse than those run by municipal departments, even though they have fewer institutional constraints. Evidently this absence of constraints may mean that resources are better channelled, but the data suggest that autonomy has also meant a greater diversion of efforts from education to other interests that could well be directly related to the evaluation of the mayor. However, interestingly enough, the introduction of municipal controls makes this difference disappear.⁷

The results also show that academic performance is affected by institutional constraints. Whilst the coefficients associated with sociodemographic variables remain statistically and economically important with the introduction of institutional controls, the coefficient associated with *bienios*, reflecting the ageing of teaching staff, is negative and significant. This means that we cannot rule out the existence of

⁶ In addition to statistical importance, there needs to be a clear analysis of pedagogical relevance. We do not make the distinction in this paper; instead, we shall later analyse orders of magnitude compared with the estimated effects of other educational programmes on performance.

⁷ Of course, the introduction of more and more controls may capture the difference between municipal corporations and departments. An analysis of the specific elements behind the different ways municipalities manage education is beyond the scope of this paper, but is clearly a natural step. See García and Paredes (2009) for a study that attempts to open up this “black box”.

TABLE 2

Municipal schools: determinants of SIMCE averages
(*Ordinary least squares*)

	Coefficient	Beta	Coefficient	Beta
Constant	203.08 (123.17) ^a		208.10 (62.65) ^a	
Income (00.000)	0.43 (22.02) ^a	0.14	0.48 (18.31) ^a	0.15
Income 2 (00.000)	-0.00000021 (16.43) ^a	-0.10	-0.0000013 (14.57) ^a	-0.10
Gender	0.98 (3.69) ^a	0.01	-0.04 (0.10)	0.00
Urban	-10.45 (24.06) ^a	-0.09	-8.71 (15.83) ^a	-0.08
Father's education (mean)	-0.05 (.36)	0.05	0.29 (1.56)	0.02
Mother's education (mean)	1.28 (8.94) ^a	0.00	0.67 (3.79) ^a	0.01
Income (mean)	0.16 (6.13) ^a	0.03	0.18 (4.97) ^a	0.03
Municipal corporation	-4.47 (15.30) ^a	-0.04	-0.95 (1.63)	-0.01
Coverage			13.15 (8.44) ^a	0.05
Number of municipal schools			0.15 (10.57) ^a	0.06
Bienios payments (00.000)			-19.58 (9.38) ^a	-0.03
Expenditure per student			0.01 (4.63) ^a	0.02
Operating expenses (00.000)			0.00 (0.33)	0.00
Investment (00.000)			0.00 (0.65)	0.00
Students registered			0.86 (0.53)	0.00
Students per teacher			-0.43 (6.32) ^a	-0.03
Staff expenses (00.000)			0.00 (9.98) ^a	0.00
Observations	121 693		72 629	
R ²	0.10			0.11

Source: estimates based on SIMCE results, Ministry of Education, and municipal data, Department of Regional and Administrative Development (SUBDERE).

^a Significant at 1%.

two effects, but the data show the predominance of a negative effect. Thus, the competing hypotheses are: (i) there is a positive effect on students' performance since teachers' tenure is associated with greater experience and capabilities, and (ii) tenure can be associated with obsolescence, and is reflected in a larger proportion of teachers covered by the Teaching Statute. Municipalities have a variable proportion of teachers working on a contract basis and not subject to the statute, allowing replacements to be made with potentially positive incentivizing effects since effort is thereby encouraged and there is the prospect of a place on the permanent teaching staff.

2. Academic performance by municipality

Using the coefficients obtained from regressions like those in table 2, we can predict the performance of students and hence of municipal schools and municipalities. Consequently, the residual of the equations should show the relative performance of each municipality. One problem with this approach, however, is that this residual may be associated not only with the true performance of each municipality, but also with the influence exerted by "other factors" which have not been considered and are not orthogonal to the variables taken.

We might argue that a ranking that could truly be associated with performance would have to be constructed from an equation that only considered sociodemographic factors and budgetary constraints as expressed in the variables included in table 2. Table 3 shows three rankings, the first unconditional, the second conditional only upon sociodemographic factors and the third, in our opinion the correct one, also conditional upon budgetary factors. Table 3 presents results for only the 20 municipalities with the best and worst performance out of the whole sample of more than 300 municipalities. The "Unadjusted" columns show the simple difference between the effective average score by municipality and the national average. The "Adjusted for sociodemographic factors" column shows the residual from a regression that controls for sociodemographic factors and educational vulnerability elements and the "Adjusted for sociodemographic and municipal factors" column shows the residual of a regression that also controls for specific elements associated with the municipality, including municipal expenditure and *bienios* payments.

From this table it is clear that the adjusted and unadjusted rankings undergo very large changes

once different types of variables are controlled for. Some municipal districts move from near the top of the ranking to near the bottom, which suggests that vulnerability explains a large part of the differences. However, more important than the precise ranking, which depends on the type of variables included, is the fact that the variance in scores between municipalities is huge whichever ranking is taken. Thus, even after adjusting for sociodemographic differences and municipal constraints, there is a difference of more than 100 points between the scores of schools in the municipalities with the best and worst results and of 45 points between the top and bottom deciles of municipalities.

3. Management

The estimated regression residuals shown in table 3 are attributable to a set of "other factors", and our hypothesis is that there are management elements among them. Management may affect performance in two ways. First, by making processes more efficient, it frees up a greater volume of resources to support teaching activities. Second, a significant part of management must consist in managing human resources and motivating student achievement.

If management elements are in fact explanatory factors that are not considered in the equations used to construct the rankings in table 3, and if they are not orthogonal to the variables included, the estimations giving rise to the ranking are not consistent. In fact, it is possible that higher-income families are over-represented in municipalities with better management, for instance. To capture the management effect, we used a number of indicators for administrative and teaching management collected by the SNED system, which is geared towards rewarding better-run schools. Among the battery of variables considered, the literature on the issue has stressed the importance of a particular subset, namely: (i) the existence of a management team, (ii) the frequency with which the management team meets, (iii) teacher follow-up and evaluation, (iv) the existence of programmes that involve training and development of staff capabilities, (v) annual planning, (vi) active involvement of the parents' association and the school community in management teams, (vii) acceptance of specific commitments by the school and (viii) disclosure to parents of information on performance test results (see, for example, Rivkin, Hanushek and Kain, 2001; Tokman, 2004; Bellei and González, 2002; Willms 2002; Pavez, 2004).

TABLE 3

Municipalities ranking best and worst for academic performance

Unadjusted		Adjusted for sociodemographic factors		Adjusted for sociodemographic and municipal factors	
<i>Top 20 municipalities</i>					
Providencia	49.42	Alto Hospicio	63.12	O'Higgins	66.62
Primavera	46.53	Mejillones	55.02	Corral	38.65
Viña del Mar	42.99	O'Higgins	50.56	Laguna Blanca	37.81
Las Condes	36.95	Isla de Pascua	42.68	Freirina	34.66
Ollagüe	36.82	Freirina	30.54	Andacollo	34.31
Licantén	34.12	Quilaco	28.9	La Higuera	30.92
Los Muermos	30.98	Corral	28.68	Sierra Gorda	30.66
Rinconada	30.83	Tocopilla	28.11	Huasco	29.57
Cabo de Hornos	30.19	Andacollo	27.81	Tocopilla	29.32
San Gregorio	28.13	Colchane	26.8	Chile Chico	29.15
Vichuquén	28.1	Lo Barnechea	26.19	Tucapel	28.33
Curaco de Vélez	27.35	La Higuera	25.01	Ollagüe	27.17
Ñuñoa	26.6	Caldera	24.97	San Gregorio	26.72
Purranque	26.45	Huasco	23.72	Caldera	23.51
Zapallar	26.26	Tucapel	22.82	Quilaco	22.87
Combarbalá	25.94	Calera	22.76	Natales	22.73
Alto Bío Bío	25.36	Calle Larga	22.71	Palena	22.49
San Fabián	24.23	Chillán Viejo	21.52	Lago Verde	22.43
Santo Domingo	23.03	Laguna Blanca	20.33	Pica	20.95
Juan Fernández	22.97	Los Vilos	20.01	Mauñin	20.41
<i>Bottom 20 municipalities</i>					
Santa Juana	-22.89	Pumanque	-22.73	Puqueldón	-15.49
Laguna Blanca	-22.9	Combarbalá	-22.98	Algarrobo	-16.33
San Antonio	-23.61	Curanilahue	-23.71	La Cisterna	-16.57
Nogales	-24.24	Castro	-24.19	Hijuelas	-17.32
Marfil	-24.47	Pelluhue	-24.47	Palmilla	-17.79
Chillán Viejo	-24.88	Puqueldón	-24.77	Llanquihue	-19.02
Calera	-26.63	Treguaco	-24.98	Placilla	-20.43
La Higuera	-28.15	Primavera	-26	Paillaco	-20.54
Lo Barnechea	-28.54	General Lagos	-26.43	Quemchi	-21.4
Tucapel	-29.25	Quillón	-26.44	Melipeuco	-21.95
Corral	-30.29	Fresia	-26.88	Teno	-23.92
Freirina	-32.14	Vichuquén	-28.96	Hualañé	-24.63
Camarones	-36.16	Traiguén	-29.41	Fresia	-26.39
Colchane	-39.65	Hualañé	-29.63	Vichuquén	-26.84
Mejillones	-40.11	Curaco Velez	-30.58	Traiguén	-28.52
Andacollo	-40.78	Licantén	-34.79	Trehuaco	-29.2
Quilaco	-45.27	Rinconada	-40.15	Licantén	-38.98
Cholchol	-46.71	Purranque	-44.28	Rinconada	-45.38
O'Higgins	-53.99	Alto Bío Bío	-46.57	Alto Bío Bío	-46.11
Alto Hospicio	-66.18	Los Muermos	-51.28	Los Muermos	-51.67

Source: rankings using estimates based on SIMCE results, Ministry of Education, and municipal data, Department of Regional and Administrative Development (SUBDERE).

We measured the effect of these variables by re-estimating the equations but bringing in management variables at this stage. One of the main problems with these variables is that they have very low variance between municipalities. This is largely because municipalities may be entitled to monetary incentives that depend on the results of these variables. Consequently, variables like “having a management team” that are basically self-reported are positive in over 90% of municipalities. A second problem is the possibly endogenous nature of the variables. To deal with this, we experimented with the use of instrumental variables. We did not find significantly different results so, once again, only OLS results are reported. The findings presented in table 4 show that having a management team, having this team meet occasionally or with high frequency, developing teachers’ capabilities and disclosing SIMCE results to parents are variables which are not only statistically significant but have an economically important impact on school performance.

Table 5 shows the rankings of the 20 best and worst municipalities in this aspect of performance and the last column shows the contribution of management factors on the assumption that management variables are orthogonal to socio-economic and budgetary variables. If this assumption is correct, management elements as measured by the SNED are indeed very important, which suggests that other management variables besides those included in the SNED may be critical.

Table 5 also shows that the order of magnitude of the difference between the municipalities with the best and worst average performance associated with factors that are neither sociodemographic nor associated with budgets or “measured management” is about 50 points, i.e., one standard deviation in the SIMCE (second column). This in turn is about nine times the effect that has been attributed to the complete school day initiative, which is costing half a point of GDP.

TABLE 4
Municipal schools: SIMCE determinants with management variables
(Ordinary least squares)

	Ministry of Education	Beta
Constant	195,35 (46,04) ^a	
Income (00.000)	0,46 (16,34) ^a	0,14
Income 2 (00.000)	0,00 (12,53) ^a	-0,10
Gender	0,43 (1,18)	0,00
Urban	-10,16 (16,63) ^a	-0,08
Father’s education (mean)	0,41 (2,07) ^b	0,01
Mother’s education (mean)	0,04 (0,19)	0,00
Income (mean)	0,18 (4,30) ^a	0,03
Municipal corporation	-1,00 (1,59)	-0,01
Coverage	15,75 (9,33) ^a	0,06
Students per teacher	-0,55 (7,32) ^a	-0,03
Bienios payments (00.000)	-20,09 (8,96) ^a	-0,04
Number of municipal schools	0,14 (8,65) ^a	0,05
Registered students	4,83 (2,76) ^a	-0,02
Staff expenses (00.000)	0,00 (8,31) ^b	-0,07
Operating expenses (00.000)	0,00 (0,75)	-0,01
Investment (00.000)	0,00 (3,43)	0,02
Management team	3,84 (4,26) ^a	0,02
Teacher evaluation	3,80 (9,87)	0,04
Parental involvement	1,68 (2,28) ^a	0,01
Annual planning	7,06 (4,05) ^a	0,01
Community involvement	7,13 (6,39) ^a	0,02
Disclosure of results	3,10 (3,33) ^a	0,01
Observations R ²	63 902 0,11	

Source: SIMCE and SNED, Ministry of Education and Department of Regional and Administrative Development (SUBDERE).

^a Significant at 1%.

^b Significant at 5%.

TABLE 5

Top- and bottom-ranking municipalities and management effects

Sociodemographic and municipal effects		Sociodemographic, municipal and managerial effects		Pure management effect	
<i>Top 20 municipalities</i>					
O'Higgins	66.62	Corral	47.15	Río Hurtado	27.63
Corral	38.65	Lago Verde	44.38	Graneros	17.29
Laguna Blanca	37.81	Sierra Gorda	37.99	Los Sauces	15.95
Freirina	34.66	La Higuera	35.07	Perquenco	14.93
Andacollo	34.31	Andacollo	34.47	Santo Domingo	13.44
La Higuera	30.92	Freirina	30.86	Antuco	10.17
Sierra Gorda	30.66	Huasco	29.24	Padre las Casas	9.37
Huasco	29.57	Mauñín	28.68	La Cruz	8.80
Tocopilla	29.32	Tocopilla	27.30	Ercilla	8.64
Chile Chico	29.15	Tucapel	26.64	Puqueldón	8.37
Tucapel	28.33	Natales	25.34	Alto Bío Bío	7.67
Ollagüe	27.17	Santa Juana	24.79	Pelarco	7.52
San Gregorio	26.72	Palena	24.36	Pemuco	7.40
Caldera	23.51	Chillán Viejo	23.09	Monte Patria	7.16
Quilaco	22.87	Chile Chico	22.7	Quirihue	7.16
Natales	22.73	Cholchol	22.27	San José de la Mariquina	7.08
Palena	22.49	Caldera	21.39	Coinco	7.00
Lago Verde	22.43	Río Ibáñez	21.23	Lautaro	6.62
Pica	20.95	Cabildo	20.94	Chile Chico	6.44
Mauñín	20.41	Calera	19.69	Marchigüe	5.96
<i>Bottom 20 municipalities</i>					
Puqueldón	-15.49	Vichuquén	-18.13	San Nicolás	-5.60
Algarrobo	-16.33	Palmilla	-18.56	Parral	-5.82
La Cisterna	-16.57	Llanquihue	-19.32	Yerbas Buenas	-6.08
Hijuelas	-17.32	Hualañé	-20.86	Pirque	-6.13
Palmilla	-17.79	Placilla	-21.11	Retiro	-6.27
Llanquihue	-19.02	Teno	-21.56	Cabildo	-6.28
Placilla	-20.43	Perquenco	-21.57	Doñihue	-6.45
Paillaco	-20.54	Quemchi	-21.94	Malipeuco	-6.67
Quemchi	-21.40	Santo Domingo	-22.00	Sierra Gorda	-7.33
Melipeuco	-21.95	Padre las Casas	-22.83	Empedrado	-7.48
Teno	-23.92	Puqueldón	-23.86	El Carmen	-7.70
Hualañé	-24.63	Los Sauces	-25.08	Mauñín	-8.27
Fresia	-26.39	Paillaco	-25.75	Corral	-8.50
Vichuquén	-26.84	Río Hurtado	-25.79	Vichuquén	-8.71
Traiguén	-28.52	Fresia	-27.56	Santa Juana	-11.09
Treguaco	-29.20	Traiguén	-29.27	San Pablo	-11.44
Licantén	-38.98	Rinconada	-29.97	Chonchi	-12.64
Rinconada	-45.38	Treguaco	-31.23	Hualaihué	-13.46
Alto Bío Bío	-46.11	Alto Bío Bío	-53.79	Rinconada	-15.42
Los Muermos	-51.67	Los Muermos	-57.23	Lago Verde	-21.96

Source: authors' calculations based on OLS estimates.

IV

Conclusions

Educational outcomes in Chile are extremely poor by international standards, especially considering the economic effort made over the last 20 years and the important role of education quality in the inequity of income distribution. One of the reasons for this lies in the poor performance of municipal schools, where teachers are subject to a very rigid employment regime.

We analysed the effects of this rigid employment regime on academic performance within the context of municipal schools and concluded that sociodemographic factors explained most of the variance in municipal schools' performance. We also showed, however, that the employment regime adversely affected those schools. Security of tenure for teaching staff is the most important variable associated with the system's

operability and has a very adverse effect on school performance. Nonetheless, this factor is not the main reason for municipal schools' poor performance. In fact, the results suggest that differences ascribable exclusively to management, measured using simple indicators monitored by the SNED programme, have the most significant effect in accounting for the variation in school performance between municipalities.

The fact that the differences in the average scores of the 20 best- and worst-performing municipalities, respectively, are some three times as great as those attributable to the complete school day initiative, a programme requiring the investment of half a point of GDP, suggests that poor academic performance in Chile may have a great deal to do with management.

(Original: English)

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