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TEACHERS' SALARY STRUCTURE AND INCENTIVES IN CHILE

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Abstract

This paper analyses the characteristics of Chilean teachers and the institutional context of teachers' labor market. Salary trends, from 1990 on, are analyzed to show the effects on the behavior of those applying to study pedagogy; in addition teachers' salaries are compared to those of other similar workers. The paper also studies the incentives implicit in the current salary structure for teachers and offers a preliminary assessment of the impact of the National System of Performance Assessment (SNED) on student outcomes. The SNED is examined for two reasons: until recently, it was the sole monetary incentive associated with teacher evaluations; and similarly, it is the sole incentive that evaluates teachers' performance according to students' results on standardized tests. Finally, the paper presents the opinions of teachers and principals about performance evaluation and monetary incentive payments associated with them.

JEL classification: I2

Key words: teachers' salaries, incentives, performance evaluation.

Introduction

The purpose of this paper is to analyze the level, trends and structure of teachers' salaries in Chile, comparing these salaries to those of other workers with similar characteristics.

Analyzing what is going on with teachers' salaries is interesting because in many countries, and Chile is no exception, teachers' salaries are often perceived to be low and less than those of other professionals. If this were the case it would have three possible effects on the efficiency of the educational process.

First, lower salaries would affect the effort and the quality of teachers' work. Second, low salaries would negatively affect the quality of education students and therefore the pool of future teachers. Third, it would be hard to keep good teachers in the profession, as they would seek better income elsewhere. These effects would produce significant inefficiencies in the educational process and negative effects in students' learning.

A question that arises is why there is more debate about teachers' salaries compared to other kinds of workers; in particular, many studies ask if teachers are underpaid. We think the explanation lies in the fact that in education the quality of teaching cannot be observed directly and therefore teachers' productivity can't be directly measured either. This fact affects how teachers' salaries are determined and structured.

One way of dealing with this issue is to introduce incentive systems that motivate teachers to give the best quality service they can. This makes it important to study not only the level and structure of teachers' salaries, but also the incentives embedded within teachers' salary structure.

This work is organized in the following manner: the first section briefly summarizes the main characteristics of Chilean teachers; the second analyzes the institutional context of teachers' labor market; the third analyses trends in salaries from 1990 on. How salaries affect the behavior of those applying to study teaching is analyzed in the fourth section, while the fifth section provides an econometric analysis of teachers' salaries, which makes it possible to compare them with those of other similar workers. The sixth section studies the incentives implicit in the current salary structure for teachers. The seventh section describes the National System of Performance Assessment (SNED) and offers a preliminary assessment of the impact of the SNED on student's outcomes. We examine the SNED for two reasons: until recently, it was the sole monetary incentive associated with evaluating teachers' performance; and similarly, it is the sole incentive that evaluates teachers' performance according to students' results on standardized tests. The eighth section presents the opinions of teachers and principals of performance evaluation and monetary incentive payments associated with them. The ninth section summarizes the conclusions.

I. Who are Chile's Teachers?

Figures from the Ministry of Education (MINEDUC) for 2001indicate there were 146,918 teachers in the country. Of these, 55% work in municipal (public) schools, 31% in subsidized private schools and the rest in fee-paying private schools. Eighty six percent of teachers work in urban schools. In terms of educational levels, 59% work in primary education, 27% in secondary, 8% in pre-school education, 4% in special education, and 1.6% in adult education. 85.5% are classroom teachers, 6.5% principals, and 3.5% technical-pedagogical personnel.[1]

Education is dominated by women, with 70% of teachers being women, and most are concentrated in pre-school and primary education; in secondary education, the distribution of men and women is more even. Despite the high percentage of women teachers, 51% of principals are men; figures are similar for the leadership of the national teachers' association (*Colegio de Profesores*).

Regarding education and experience, the vast majority (90%) have a university degree. One-third (33%) have less than 10 years of experience, 25% have 10 to 19 years of experience, 27% from 20 to 29 years and 15% 30 years or more.

As with most countries, teachers work fewer hours than the average Chilean worker. Just 22% of teachers work 44 hours a week (this is the maximum number of hours of work allowed with the same employer in the subsidized system), while the work week defined by the Chilean labor code currently amounts to 48 hours per week, and will fall to 44 hours in 2005. 35% work from 31 to 43 hours, 29% work 30 hours and 15% work less than 30 hours. Just 10% work more than 44 hours a week, which is consistent with the fact that just 13% of teachers work in more than one school.

II. How Teachers' Salaries are Determined

There are three types of schools in Chile: municipal (public) schools, subsidized private schools, and fee-paying private schools.[2] There are also, therefore, three types of employment contract in the Chilean school system: those corresponding to the municipal system, governed by the Teachers' Statute (*Estatuto Docente*) established in 1991[3]; those in the subsidized private sector, governed by the Labor Code, which covers all private sector workers, but for which certain rules in the Teachers' Statute are binding, among them minimum salaries, the length of the working day, legal holiday periods and termination; and finally, contracts in the fee-paying private sector, also

[1] The rest consist of principals of rural schools and unclassified others.

[2] Municipal schools are financed through a per-student subsidy provided by the State and run by municipalities (local governments); they serve some 56% of enrolment. Subsidized private schools are financed by the per-student subsidy provided by the State, but owned and operated by the private sector: they account for 34% of enrolment. Fee-paying private schools operate on the basis of fees paid by parents and represent around 10% of enrolment. For more information about the Chilean educational system, see Mizala and Romaguera (2000a).

[3] In the early 1980s, the Chilean educational system was decentralized, with public schools becoming dependent on municipal governments. Teachers thus ceased to be public employees and came under the private Labor Code. With the return of democratic rule, a special statute was created that defined new labor conditions for teachers.

governed by the Labor Code, but for which the rules in the Teacher Statute are not binding.[4]

In the case of municipal schools, the Teachers' Statute establishes a common salary structure, based on the Basic National Wage (RBMN) per teaching hour. This basic wage is increased by a series of allowances, many of which are linked to the RBMN. These allowances reflect years of experience, responsibility, training, and work in difficult conditions, among others (see Table A1 in the Appendix).

In the municipal sector, control over contracts and salaries is nonetheless centralized in the Ministry of Education. Likewise, centralized collective bargaining is not established by law, but is a consequence of the creation of a national scale that standardizes teachers' pay; in practice, wage negotiations have the characteristics of a bilateral monopoly (González, 1998).

In the private sector, teachers enjoy collective bargaining rights as per private sector regulations, although parties may agree to function under the rules governing the municipal sector.

As a result of the Teachers' Statute of 1991, the number of students schools managed to retain in their classrooms ceased to affect teachers' job security. For this reason, Law 19,410 (1995) attempted to restore some flexibility to the system. This legislation abolished lifetime employment, making it possible to adjust staffing, transfer teachers between schools in the same municipality, rationalize resources and even merge schools. In addition, the law introduced periodic competitions for management posts in municipal schools, which is important since school principals can exert leadership that has a significant impact on a school's results.

In addition, the wage agreement that ended the dispute between the teachers' union and the Education Ministry in 1994 established a bonus payment unrelated to teachers' years of service, but inversely proportional to excess staffing levels in the school or municipality. This legislation also set up the National System of Performance Assessment (SNED), which awards an excellence bonus to the best schools in each region of the country.[5] Also, in 2000, a parallel teaching excellence bonus (*Asignación de Excelencia Pedagógica*) for those teaching the first four years of primary education was added. This bonus consists of a voluntary, individual evaluation associated with a money award. To receive this award, teachers must successfully pass knowledge-based examinations, present their curricula, and a recording of a class.

The shift toward more flexibility has been difficult because the teachers' association has embraced the Teachers' Statute as an historic aspiration, which protects teachers from job insecurity and arbitrary actions by administrators.[6] However, and independently of the teachers' association stance, in recent years there have been signs of a change in teachers' attitude toward greater acceptance of elements such as evaluation and payment for performance (see last section of this paper). This is very important because for good management of human and financial resources it is

[4] See Mizala et al. (2002b) for a detailed analysis of the different types of teachers' contracts in Chile.
[5] See Mizala and Romaguera (2002a) for further details on the SNED.
[6] For more details see Belleï (2001).

necessary to design more flexible labor regulations that make managerial efficiency possible and encourage the improvements required for educational quality.

III. Changes in Teachers' Salaries

Figures from the Ministry of Education reveal that between 1990 and 2002, teachers' average salaries rose 156%; the entry level salary, meanwhile, rose 173% in the municipal sector and 431% in the subsidized sector during the same period[7] (Table 1). Unfortunately, except for the starting salary established in the Teachers' Statute, there is no information on the salaries paid in the private sector, since these are the result of decentralized bargaining at each school.

Table 1
Monthly Real Salaries of Full-Time (44 hours) Teachers
(average Ch pesos, 2001)

		Municipal Sector		Private subsidized Sector
	Years	Average salary	Starting salary	Starting salary
	1990	258,242	142,591	73,337
	1991	276,574	172,166	160,026
	1992	323,311	191,293	184,123
	1993	363,540	202,458	187,950
	1994	413,452	234,933	210,122
	1995	454,991	259,263	253,888
	1996	488,420	284,977	283,746
	1997	533,762	312,885	311,272
	1998	561,318	340,970	340,721
	1999	589,431	363,942	363,942
	2000	615,368	385,331	385,331
	2001	631,813	390,354	390,354
*	2002	660,161	389,422	389,422

Source: Ministry of Education

Notes:

1. The average salary includes: RBMN plus benefits (10 two-year periods, responsibility, upgrading, performance, difficult conditions), UMP, proportional bonuses, total handicap, excellence bonuses and additional salaries.
2. The starting salary includes RBMN, UMP base; proportional bonus and complementary allowances (see Table A1 for details).
3. Includes national zone average.
* Estimates, assumptions: CPI 2002 = 3.0%, Public wage cost of living adjustment in 2002 = 3.0%

[7] The strong rise in the starting salary in the subsidized private sector reflects the fact that it was very low in 1990.

It is important to note that between 1981 and 1990 teachers' monthly real salaries declined 32% due to budgetary reductions throughout the economy; therefore, part of the increase during the 1990s was to make up for this decline. Nonetheless, by 1997 teachers' monthly real salaries were already 23% higher than their 1981 peak.[8]

If we examine Table 1, the question arises of how teachers' salaries compare to others in the economy. For this purpose, Table 2 shows the changes in the general wage index, professional salaries, and teachers' salaries, for the period 1993-2001.[9] The rate of change in teachers' salaries (81.5%) went far beyond the general wage index (25.5%) and that of professionals (55.8%).

Whereas in 1993 teachers earned 1.8 times the income of an average worker within the economy, by 2001 teachers were averaging 2.6 times that income. It is important to compare teachers' earnings versus those of other workers in the economy. If we compare teachers with professionals, which is the occupational group whose salaries rose the most in this period,[10] we see that teachers' salaries went from 82% of professionals' in 1993 to 96% in 2001, that is, in 2001 teachers on average earned practically the same as professionals.[11]

Table 2
Comparing Teachers' Salaries with the Average Wage and Professionals' Salaries
(average Ch pesos, 2001)

Years	Average wage	Professional salaries	Teachers salaries	Teacher/ average wage	Teachers/ professionals
1993	201,083	441,903	363,540	1.81	0.82
1994	215,567	490,243	413,452	1.92	0.84
1995	226,338	517,801	454,991	2.01	0.88
1996	234,106	545,510	488,420	2.09	0.90
1997	240,084	580,160	533,762	2.22	0.92
1998	242,987	612,452	561,318	2.31	0.92
1999	245,797	645,324	589,431	2.40	0.91
2000	248,612	652,428	615,368	2.48	0.94
2001	249,479	663,804	631,813	2.53	0.95
2002	252,394	688,529	660,161	2.62	0.96
Rate of change 2002/1993 (%)	25.52	55.81	81.59		

Source: INE and Ministry of Education.

[8] There is no time series information available on teachers' average salaries before 1990, so it is difficult to make time comparisons of teachers' salaries before then.
[9] The series only starts in 1993 because that year the National Statistics Bureau calculated a new wage index, with a substantially different methodology from the previous one, so it would not be suitable to compare series.
[10] See Cowan et al. (2002)
[11] At this point we are only comparing the evolution of teachers' salaries *vis à vis* other occupational groups; in section V of the paper we analyzed teachers' salaries with those of workers with similar characteristics.

Table 3 compares the evolution of teachers' starting salary in the municipal sector[12] with the minimum wage within the economy. Teachers' starting salary is about 3.6 times the general minimum wage. Until 1998, teachers' starting salary grew more than the minimum wage every year, and only as the country's growth slowed (1999) due to the impact of the Asian crisis did teachers' starting salary grow less than the general minimum wage.

Table 3
Comparison of Teachers' Starting Salary with the National Minimum Wage
(Ch pesos of each year)

Years	National minimum wage	Municipal teachers' starting salary	Teachers' starting salary/ minimum wage	Rate of annual change (%)	
				National minimum wage	Municipal teachers' starting salary
1993	42,917	126,039	2.94		
1994	49,588	163,024	3.29	15.54	29.34
1995	56,088	194,703	3.47	13.11	19.43
1996	62,750	229,793	3.66	11.88	18.02
1997	68,942	267,825	3.88	9.87	16.55
1998	76,708	306,794	4.00	11.26	14.55
1999	86,333	338,409	3.92	12.55	10.30
2000	96,042	372,057	3.87	11.25	9.94
2001	103,208	390,344	3.78	7.46	4.92
2002	111,420	401,087	3.60	7.96	2.75

Source: INE and Ministry of Education

It is interesting to compare teachers' salaries in Chile with those of OECD and developing countries like Chile. Table 4 provides information for 2001 on starting salaries and for teachers' with 15 years' experience in primary and secondary education in dollars comparable for PPP (*purchasing power parity*). The ratio between salaries and per capita GDP in each country is provided for the purpose of comparison. Chile pays relatively similar salaries in relation to its per capita GDP, compared to the OECD mean, a selection of OECD countries and some developing countries.

[12] From 1998 on, teachers' minimum wage became the same for both the municipal and the private subsidized sector.

Table 4
International Comparisons of Teachers' Salaries. 2001

Annual statutory salaries of teachers in public institutions at starting, after 15 years of experience and at the top of the scale by level of education, in equivalent US dollars converted using PPPs

	Primary education				Lower secondary education				Upper secondary education			
	Starting salary/ minimum training	Salary after 15 years of experience /minimum training	Salary at top of scale /minimum training	Ratio of salary after 15 years of experience to GDP per capita	Starting salary/ minimum training	Salary after 15 years of experience /minimum training	Salary at top of scale /minimum training	Ratio of salary after 15 years of experience to GDP per capita	Starting salary/ minimum training	Salary after 15 years of experience /minimum training	Salary at top of scale /minimum training	Ratio of salary after 15 years of experience to GDP per capita
OECD countries												
Australia	27.980	39.715	39.715	1,45	28.025	39.668	39.668	1,44	28.024	39.668	39.668	1,44
Czech Republic	10.704	13.941	18.429	0,97	10.704	13.941	18.429	0,97	12.200	15.520	21.045	1,08
England	23.297	36.864	36.864	1,46	23.297	36.864	36.864	1,46	23.297	36.864	36.864	1,46
France	21.702	29.193	43.073	1,14	24.016	31.507	45.501	1,23	24.016	31.507	45.501	1,23
Germany	38.412	46.459	49.839	1,75	39.853	49.053	51.210	1,84	43.100	52.839	55.210	1,99
Italy	23.537	28.483	34.339	1,07	25.400	31.072	37.798	1,17	25.400	31.959	39.561	1,20
Korea	25.177	42.845	68.581	2,69	25.045	42.713	68.449	2,69	25.045	42.713	68.449	2,69
Mexico	11.703	15.455	25.565	1,69	14.993	19.588	32.240	2,14	m	m	m	m
New Zealand	17.544	33.941	33.941	1,61	17.544	33.941	33.941	1,61	17.544	33.941	33.941	1,61
Portugal	19.585	28.974	52.199	1,56	19.585	28.974	52.199	1,56	19.585	28.974	52.199	1,56
Spain	26.875	31.357	39.123	1,50	30.228	35.215	43.790	1,68	31.345	36.500	45.345	1,74
United States	28.681	41.595	50.636	1,19	28.693	41.595	49.728	1,19	28.806	41.708	49.862	1,19
OECD mean	***21.982***	***30.047***	***36.455***	***1,31***	***23.283***	***31.954***	***38.787***	***1,34***	***24.350***	***34.250***	***41.344***	***1,43***
Non-OECD countries												
Argentina	8.181	11.362	13.568	0,92	10.617	15.249	18.454	1,23	10.617	15.249	18.454	1,23
Brazil	7.922	10.695	11.628	1,45	14.900	17.263	18.800	2,35	16.701	17.777	20.326	2,42
Chile	11.631	12.902	17.310	1,37	11.631	12.902	17.310	1,37	11.631	13.487	18.107	1,43
Peru [1]	5.597	5.597	5.597	1,22	5.536	5.536	5.536	1,20	5.536	5.536	5.536	1,20
Philippines	10.777	11.896	12.811	3,06	10.777	11.896	12.811	3,06	10.777	11.896	12.811	3,06
Uruguay [3]	5.734	6.872	8.295	0,76	5.734	6.872	8.295	0,76	6.240	7.378	8.801	0,82

Source: OECD

1. Year of reference 2000.

2. Including additional bonuses.

3. Salaries for a position of 20 hours per week. Most teachers hold two positions.

This rise in teachers' salaries explains a significant part of the increase in the Ministry of Education's expenditures during this period. This is confirmed by noting that total MINEDUC spending tripled between 1990-2001 and the corresponding expenditure on the per student voucher that the ministry pays to schools also tripled, to maintain a share of about 64% of total expenditure.

The information available indicates that a significant part of the resources transferred via vouchers go to paying teachers' wages in the municipal system.[13] A study by Gonzalez, Mizala and Romaguera (2001) estimates that on average at the municipal level, spending on remuneration absorbs about 85% of voucher income, with a standard deviation of 14%.

As a result, it can be concluded that the rise in teachers' salaries does to a large degree explain the significant rise in MINEDUC spending for the period studied.

[13] No information is available on the percentage of the subsidy received by private subsidized schools that goes to salaries.

Table 5
Total Expenditures of the Ministry of Education 1990-2001
(millions of Ch$ 2001 and percentages)

Year	Total Expenditures	Total Operational Expenditures	Current Transfers								Total Capital Expenditures[5]
			Total	Vouchers	Higher Education Expenses	Learning resources[1]	Programs[2]	Scholarships[3] and Categorical Aid	Research[4] and Development	Other Transfers	
1990	556,474	53,349	502,783	355,070	88,645	589	1,448	45,531	9,465	2,035	341
(%)	(100)	(9.6)	(90.4)	(63.8)	(15.9)	(0.1)	(0.3)	(8.2)	(1.7)	(0.4)	(0.1)
1991	605,500	57,547	547,606	364,449	103,181	1,587	4,853	58,850	11,643	3,043	347
(%)	(100)	(9.5)	(90.4)	(60.2)	(17.0)	(0.3)	(0.8)	(9.7)	(1.9)	(0.5)	(0.1)
1992	685,751	66,194	612,973	403,986	109,519	2,406	2,056	74,217	10,931	9,859	6,584
(%)	(100)	(9.7)	(89.4)	(58.9)	(16.0)	(0.4)	(0.3)	(10.8)	(1.6)	(1.4)	(1.0)
1993	766,272	77,326	685,955	442,076	115,399	4,841	2,718	80,371	21,878	18,673	2,991
(%)	(100)	(10.1)	(89.5)	(57.7)	(15.1)	(0.6)	(0.4)	(10.5)	(2.9)	(2.4)	(0.4)
1994	831,749	76,310	755,405	501,751	120,108	2,747	4,328	82,935	25,416	18,121	33
(%)	(100)	(9.2)	(90.8)	(60.3)	(14.4)	(0.3)	(0.5)	(10.0)	(3.1)	(2.2)	(0.0)
1995	959,779	73,395	886,406	607,521	134,545	3,651	4,946	84,013	22,371	29,359	-22
(%)	(100)	(7.6)	(92.4)	(63.3)	(14.0)	(0.4)	(0.5)	(8.8)	(2.3)	(3.1)	(0.0)
1996	1,088,436	85,417	989,349	685,526	137,655	9,598	4,322	92,773	22,171	37,304	13,670
(%)	(100)	(7.8)	(90.9)	(63.0)	(12.6)	(0.9)	(0.4)	(8.5)	(2.0)	(3.4)	(1.3)
1997	1,211,888	91,870	1,100,674	777,612	142,758	8,882	6,580	90,635	23,265	50,942	19,343
(%)	(100)	(7.6)	(90,8)	(64.2)	(11.8)	(0.7)	(0.5)	(7.5)	(1.9)	(4.2)	(1.6)
1998	1,335,315	106,363	1,206,914	836,220	157,648	11,793	9,832	97,002	24,662	69,757	22,038
(%)	(100)	(8.0)	(90.4)	(62.6)	(11.8)	(0.9)	(0.7)	(7.3)	(1.8)	(5.2)	(1.7)
1999	1,453,084	102,231	1,311,213	905,325	162,899	14,799	11,078	106,771	31,067	79,273	39,640
(%)	(100)	(7.0)	(90.2)	(62.3)	(11.2)	(1.0)	(0.8)	(7.3)	(2.1)	(5.5)	(2.7)
2000	1,570,038	97,614	1,386,094	988,769	164,912	20,377	9,295	112,945	26,173	63,623	86,330
(%)	(100)	(6.2)	(88.3)	(63.0)	(10.5)	(1.3)	(0.6)	(7.2)	(1.7)	(4.1)	(5.5)
2001	1,687,861	105,500	1,495,466	1,080,992	171,262	16,333	14,969	119,168	29,051	63,690	86,894
(%)	(100)	(6.3)	(88.6)	(64.0)	(10.1)	(1.0)	(0.9)	(7.1)	(1.7)	(3.8)	(5.1)

Source: MINEDUC

Notes:

(1) It includes textbooks, pedagogical resources, learning guides, classroom libraries, computers and software. It does not include the expenses of specific Programs

(2) Programs considered: Intercultural Bilingual Education, Drug addiction and Alcoholism, Pre-school Education; PEBM Workers, P900; Know your child, Elementary school MECE, Adult education, Anticipation High school, Elementary Rural school

(3) Scholarships considered: Indigenous scholarships, Outstanding students in pedagogy, Secondary education scholarships and categorical aid, JUNAEB scholarships, Higher education scholarships

(4) It corresponds to research funds (FONDEF and FONDECYT) managed by CONICYT.

(5) It corresponds to capital contributions to: Full day school, High school for all, Higher Education infrastructure and Financial investment.

IV. Impact of Salary Trends on People Applying to Study Education

Despite a significant rise in teachers' salaries in the past 13 years, teachers' discourse remains that their salaries are lower than those of other professionals. This perception of low salaries is worrisome since it directly affects the quality of students entering education programs: all things being equal, the best students would prefer other fields.

In fact, from 1980 to 1994 the number of education students fell by about 43% (Ormeño et al., 1996); many reasons could explain this behavior, one being the plunge in teachers' salaries as monthly real salaries declined 32% in real terms during the 1980s, due to budgetary reductions experienced by the Chilean economy.

However, the information available suggests that this trend turned around in 1997, with registration in education programs rising along with average entry scores; this could partly reflect extensive publicity from the Ministry of Education for educational reforms, the scholarship policy it implemented for outstanding pedagogy students, and higher teachers' salaries. Moreover, the Ministry of Education has implemented special programs to reinforce the teaching profession. Unfortunately, there is no information that could allow us to isolate the impact each of these policies has had on the number and quality of teacher education students.

The number of education students rose 39%, from 19,995 in 1997 to 27,817 in 2001. At the same time, Table 6 shows an improvement in applicant quality, measured using scores on national university entrance examinations (the *PAA* or *Prueba de Aptitud Académica)*. This increase in average scores is not a generalized phenomenon; in fact, the PAA is a national test with mean 500 and standard deviation 100. At the school of engineering during the same period, the change of the score of the first student selected fluctuated between 1.1% and 0.03%, and the score of the last student selected fluctuated between 1.2% and -1.2%. The increase in the quantity and quality of education students is very important because it points to the successful implementation of educational reforms that require the creation of a pool of good, highly trained teachers.

Table 6
Average Score for Admission to Teaching Programs

Admission Year	Average Score (PAA)	Change
1998	536.50	
2000	590.93	10.1%
2001	604.80	2.3%
2002	616.65	2.0%
2003	624.29	1.2%

Source: OECD (2004), based on DEMRE, University of Chile.

V. Analysis of Teachers' Income

The information presented gives a general picture of trends in teachers' salaries and differences in remuneration between teachers and other people. However, it does not enable us to draw any definite conclusion about teachers' pay compared to other workers, since, to be able to answer the question of whether teachers are over- or underpaid, we need to compare individuals with similar characteristics in terms of both human capital and the jobs they perform.

It is therefore worthwhile to explore more in depth the differences between teachers' salaries and those of workers with similar characteristics.[14]

This analysis is based on data from the 1998 and 2000 national household surveys (CASEN).[15] The CASEN provides information on personal characteristics, as well as individuals' occupation. Table 6 gives information on the income, human-capital characteristics and employment of teachers and non-teachers.[16]

One first important element to point out is that the hourly wage obtained from the 1998 CASEN is very similar to the one teachers declared in a survey conducted by the authors of this study in Greater Santiago between November 1998 and January 1999.[17] The hourly income from their main job was 1,849 pesos according to the 1998 CASEN, and 1,805 pesos according to the survey, both expressed in 1998 Chilean pesos (Ch pesos). The exchange rate stood at 460.3 pesos per US dollar in 1998 and 539.5 pesos per US dollar in 2000.

The comparative analysis between teachers and other non-agricultural workers shows that hourly earnings from the main occupation are higher for teachers than other occupational groups; the same is true for total earnings from the main job and earnings from all sources of labor income (Table 7).

On average, teachers have more years of schooling than other workers, less potential experience, and a high percentage hold a professional degree or diploma of some kind. Table 7 also reflects the well-known fact that a high proportion of teachers are women.

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[14] In recent years several studies have examined the issue of teachers' salaries in Latin America; Table A2 in the appendix summarizes the main findings. The results are mixed, indicating that there is no robust empirical evidence proving that teachers receive lower salaries than a comparative group. Nonetheless, not all the studies control for workers' characteristics. Many of the studies reviewed consist of a relatively aggregate comparison of salaries between teachers and other groups. Similarly, studies based on econometric analyses, except for those of Piras and Savedoff (1998), and Lopez-Acevedo and Salinas (2000), assume that returns are similar for teachers and other workers.
There are also studies addressing this issue for non-Latin American countries, for instance Komenan and Grootaert (1990) study teachers' vs. non-teachers' pay differences in the Cote D' Ivoire, and Zymelman and DeStephano (1989) study teaching salaries in Sub-Saharan African countries. In the case of the United States, this issue was analyzed by Flyer and Rosen (1996), Ballou and Podgursky (1996) and Lankford and Wyckoff (1997), among others.

[15] The analysis using the 1998 CASEN survey was published in Mizala and Romaguera (2000b)

[16] In 1998, 1,791 persons employed as teachers in either elementary or secondary schools were identified according to their job and profession; the comparison group consists of 58,006 persons over 15 years of age, who reported receiving income from work in either the public or private sector, excluding agricultural workers. In 2000, 2,394 persons employed as teacher were identified; the comparison group is made up of 51,917 persons.

[17] For more details about the survey, see Mizala et al. (2002b).

Table 7
Means and Standard Deviations of Selected Variables
Teachers versus Non-teachers, 1998 and 2000

Variables	1998		2000	
	Teacher	**Non-Teacher**	**Teacher**	**Non-Teacher**
Hourly earnings in main job (Ch pesos)	1,849	1,242	1,962	1,256
	(1,465)	(3,151)	(1,504)	(2.292)
Average hours worked per month[3]	156	197	157	194
	(50)	(100)	(70)	(88)
Income from main job (thousand Ch pesos)	263	213	277	215
	(183)	(541)	(164)	(351)
Age	40	38	41	39
	(10)	(12)	(11)	(13)
Years of schooling	15.7	9.6	15.3	10.0
	(2.2)	3.8)	(2.5)	(3.9)
Professional degree (%)	78	10	76	12
	(41)	(29)	(43)	(32)
Potential experience (years)	18.6	21.9	19	23
(age-education-6)	(10.3)	(13.8)	(11)	(14)
Men (%)	30	69	31	64
	(46)	(46)	(46)	(48)
Number of observations	**1,791**	**58,006**	**2,394**	**51,917**

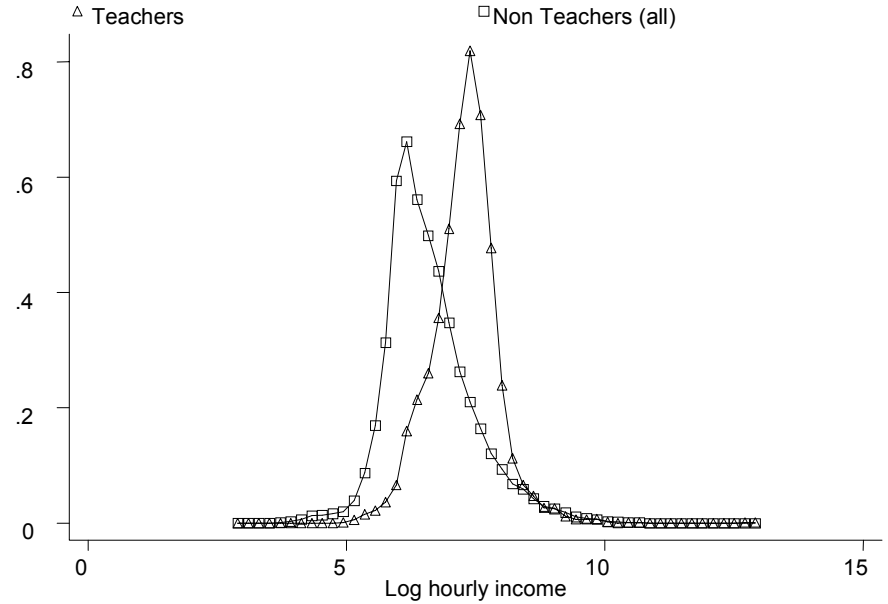
Source: Authors' calculations based on 1998 and 2000 CASEN household survey

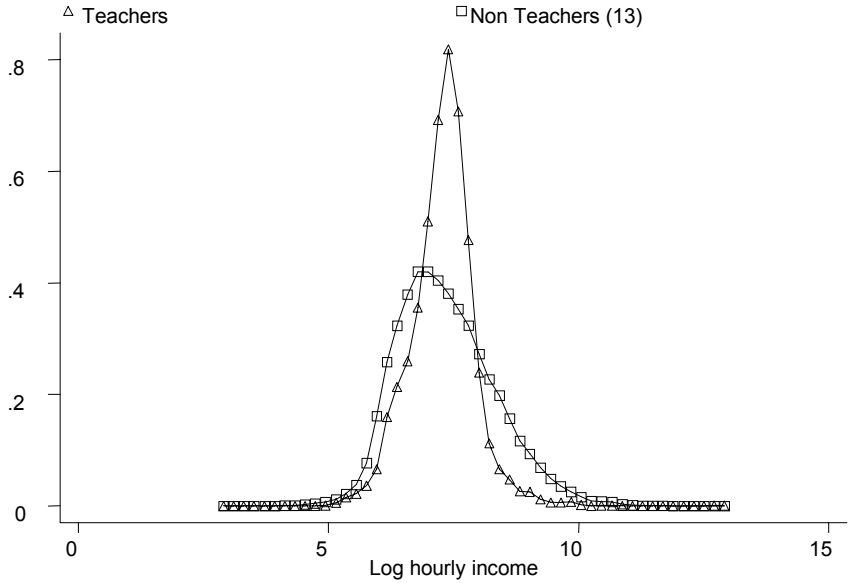
Notes: (1) The exchange rate is 460.3 pesos per US dollar in 1998 and 539.5 pesos. (2) We use hourly earnings because teachers are paid by the hour and work fewer hours than other workers. (3) Teachers declare they work 21 days per month, non-teachers declare they work 23 days per month.

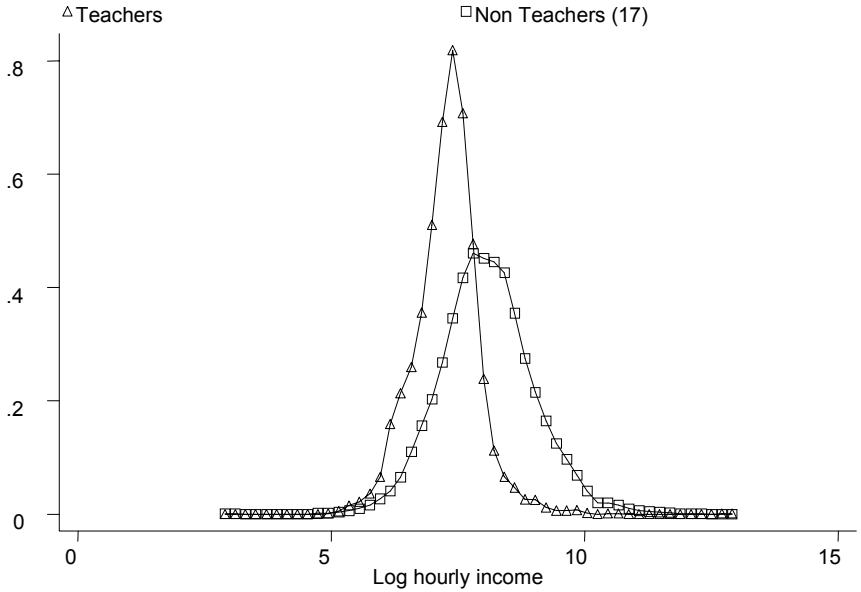
Graph 1 and Graph 2 show the distribution of hourly income from teachers' main job compared to other workers, for 1998 and 2000 respectively. The graphs also show a comparison between teachers and more educated workers (13 or more years of education and 17 or more years of education). The distribution of hourly income from the main job held by workers with 17 or more years of education is to the right of teachers' distribution. This is not the case when we compare teachers with workers with 13 or more years of education who on average have the same years of schooling than teachers[18].

[18] Workers with 13 or more years of education are people with post-secondary, but not necessarily university education or with incomplete university studies.

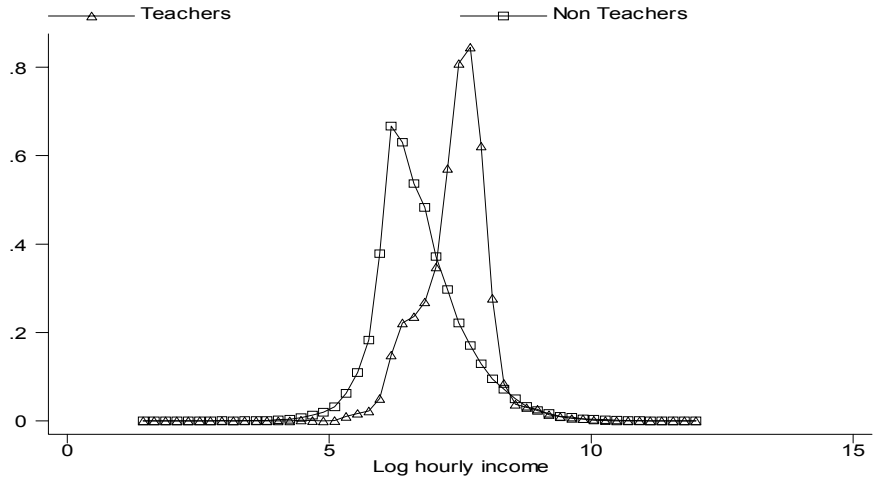
Graph 1
Hourly Income Distribution of Teachers and Non-Teachers. 1998

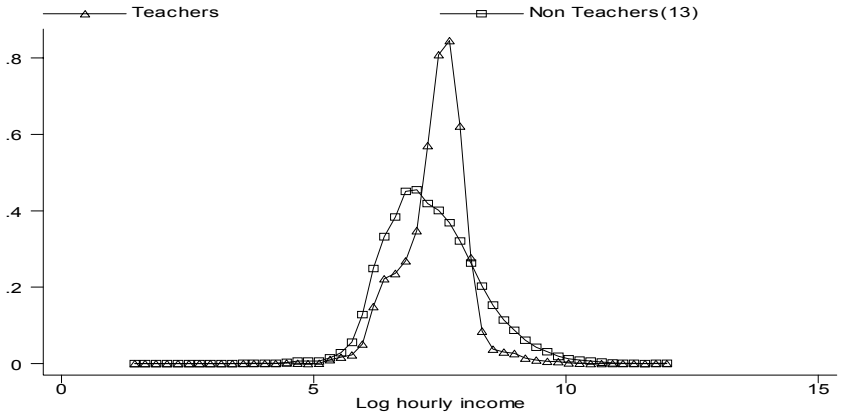


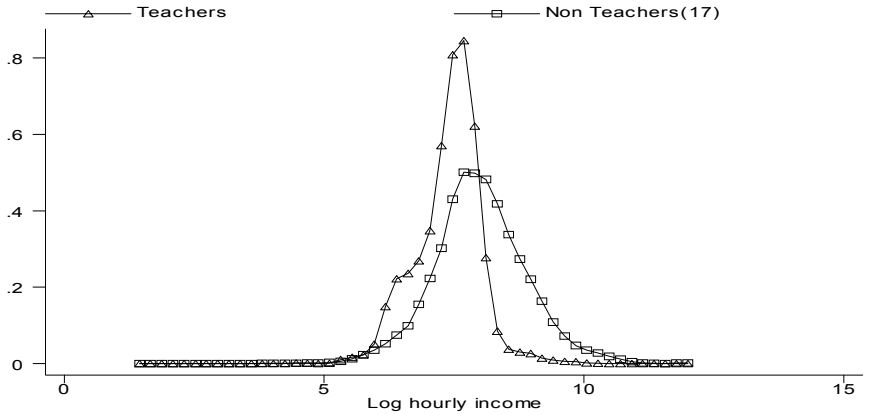




Graph 2
Hourly Income Distribution of Teachers and Non-Teachers. 2000







To compare the earnings of different workers a Mincer (1974) type earnings equation has been estimated for the complete sample of persons who reported receiving income in the 1998 and 2000 CASEN, distinguishing between teachers and other workers.

The estimated equation is:

(1) $$Ln(W/hr)_i = \beta + \beta_N \; N \; X_i + \beta_T \; T \; X_i + v_i$$

Where: Ln (W/hr) is the logarithm of hourly earnings from primary employment.

X is a vector of personal and job characteristics of individual i

T represents teachers

N represents non-teachers (comparison group)

T and N are dummy variables used to distinguish teachers from non-teachers. T=1 if the individual is a teacher; N=1 if the individual is a non-teacher.

The reason for estimating a full interaction earnings equation is to explore whether the return on human capital, mainly education and experience, varies between teachers and non-teachers. We also estimate a single model in which the coefficients are assumed to be the same for teachers and non-teachers; in this case the dummy variable for being a teacher would capture over- or under-payment to the teaching profession. The estimated equations are presented in Table A3 and A4 in the appendix.

The dependent variable is the logarithm of hourly earnings from primary employment. We use hourly earnings because, as mentioned, teachers work fewer hours than other workers and also because in Chile teachers are paid by the hour. It can be argued that teachers probably do not declare in the survey the amount of hours they work at home preparing lectures or correcting exams; however, in this study we have not corrected for the larger number of vacation days teachers enjoy. They have eight weeks of vacation per year while other workers have three. Therefore, if there is a bias it tends to overestimate the number of hours teachers work.

Tables 8 and 9 give the results obtained from estimating equation (1) with data for 1998 and 2000 and indicate whether or not the estimated coefficients for the two groups are statistically different. The results are similar for both years.

There are considerable differences between the earnings profiles of the two groups. The constant term is higher for teachers than for other workers; however, the return on schooling is less for teachers, as is the return on holding a professional degree. This means that teachers' earnings profile starts above the profile for non-teachers but is flatter.

Also, unlike other workers, teachers' pay does not vary according to gender. Nor do men's and women's rate of return on experience vary. In the case of non-teachers, men

have a higher rate of return on experience than women and a greater depreciation of their human capital over time.

A similar phenomenon can be observed with respect to geographical location: teachers' pay does not vary according to whether they work in urban or rural areas, or other administrative regions within the country.[19]

This improved degree of earning equality by gender and location among teachers reflects how teachers' pay is calculated, especially for those working in the municipal school sector, as set out in the Teachers' Statute.

It is interesting to note that when we run a single equation in which the returns are assumed to be the same for both groups (Tables A3 and A4), we obtain a dummy variable for being a teacher equal to 0.028, which is statistically significant at a 10% level for 1998, and 0.044, which is statistically significant at a 5% level for 2000. The results imply that on average teachers earn salaries similar to workers with the same characteristics, although this difference is slightly more positive for the year 2000.

However, if we allow the returns to be different for teachers and non-teachers, the analysis shows that the earnings profile for teachers is different from those of other workers. Although gender and region have statistically significant effects on the earnings of non-teachers, these factors do not affect teachers' pay. In addition, although the return on years of schooling and having a professional degree is statistically significant, it is less so than for non-teachers. However, the constant term is higher for teachers, so the earnings profile starts above the profile for non-teachers, but is flatter.[20]

[19] The country is divided into 13 administrative regions. Santiago, the capital city, is in the Metropolitan Region.

[20] These results do not change when the income equation takes into account only teachers (937) and non-teachers (2,696) with 17 or more years of schooling. The constant term remains higher for teachers than for other workers, but the return on years of schooling is not statistically significant for teachers; only having a professional degree significantly affects teachers' hourly income.

Table 8
Determinants of Labor Income, Teachers vs. Non-Teachers, 1998

(dependent variable: logarithm of hourly earnings from primary employment)

Variable	Teacher		Non-teacher	
	Coefficient	t	Coefficient	t
Constant$^{\Psi}$	6.704	38.75**	5.227	258.57**
Years of schooling$^{\Psi}$	0.024	2.09*	0.095	88.15**
Potential experience$^{\Psi}$	-0.003	-0.55	0.013	11.10**
Potential experience squared$^{\Psi}$	0.0003	2.35*	-0.00004	-1.79
With professional qualification (degree) $^{\Psi}$	0.277	4.87**	0.469	48.67**
Man* potential experience$^{\Psi}$	-0.008	-0.79	0.006	3.95**
Male* potential experience squared$^{\Psi}$	0.0003	1.47	-0.0001	-4.16**
Single person	-0.073	-1.95*	-0.102	-14.37**
Male $^{\Psi}$	0.088	0.93	0.110	7.14**
Urban $^{\Psi}$	-0.002	-0.02	0.153	16.49**
Owner	0.758	4.79**	1.176	86.16**
Self-employed $^{\Psi}$	1.125	13.67**	0.567	80.62**
Domestic service, living out	-	-	-0.139	-10.02**
Unpaid family member	-	-	0.159	0.41
Armed forces	-	-	0.166	6.57**
Region 1 $^{\Psi}$	-0.088	-0.94	-0.167	-9.72**
Region 2 $^{\Psi}$	0.125	1.30	0.015	0.91
Region 3 $^{\Psi}$	-0.031	-0.29	-0.168	-7.82**
Region 4 $^{\Psi}$	-0.150	-1.92	-0.207	-14.09**
Region 5 $^{\Psi}$	-0.099	-2.10*	-0.192	-20.91**
Region 6	-0.188	-2.49*	-0.177	-13.77**
Region 7 $^{\Psi}$	-0.099	-1.55	-0.233	-19.05**
Region 8 $^{\Psi}$	-0.066	-1.54	-0.264	-28.99**
Region 9 $^{\Psi}$	-0.122	-2.04*	-0.278	-20.93**
Region 10 $^{\Psi}$	-0.039	0.67	-0.332	-28.47**
Region 11 $^{\Psi}$	0.226	1.31	-0.038	-1.11
Region 12 $^{\Psi}$	0.133	0.95	0.082	3.15**
Adjusted R^2		0.49		
F		1,130.0**		
N		59,791		

Source: 1998 CASEN Survey.

Notes: This regression considers all non-agricultural workers 15 years and over. Reference dummy variables: 13th Region (Santiago Metropolitan Region); employees.

* *statistically significant at 1%; * statistically significant at 5%.

Ψ Difference between coefficients significant at 1%.

Table 9
Factors Determining Labor Income, Teachers vs. Non-Teachers, 2000
(dependent variable: logarithm of hourly earnings from primary employment)

Variable	Teacher		Non-teacher	
	Coeff.	T test	Coeff.	T test
Constant	6.237	56.37**	5.458	228.83**
Years of schooling	0.055	7.79**	0.091	77.47**
Potential experience	0.007	1.61	0.010	8.86**
Potential experience squared	0.000	1.55	-0.000	-2.06*
With professional qualification (degree)	0.327	8.66**	0.462	47.28**
Male* potential experience	0.002	0.30	0.010	7.03**
Male* potential experience squared	0.000	-0.34	0.000	-6.20**
Single person	-0.045	-1.67	-0.113	-14.37**
male	0.115	1.47	0.074	4.43**
Urban	-0.075	-1.48	0.068	4.96**
Owner	0.142	0.78	1.083	74.52**
Self-employed	1.058	17.45**	0.401	51.97**
Domestic service, living out			-0.116	-8.37**
Armed forces			0.118	5.11**
Region 1	-0.080	-1.06	-0.220	-12.42**
Region 2	-0.059	-0.87	0.158	9.28**
Region 3	-0.331	-4.58**	-0.135	-5.78**
Region 4	-0.252	-4.24**	-0.197	-11.08**
Region 5	-0.164	-4.35**	-0.204	-20.42**
Region 6	-0,280	-5.59**	-0.188	-12.56**
Region 7	-0.075	-1.68	-0.237	-16.21**
Region 8	-0.195	-5.81**	-0.271	-26.83**
Region 9	-0.103	-2.10*	-0.242	-15.92**
Region 10	-0.103	-2.34*	-0.243	-17.82**
Region 11	0.194	1.27	-0.029	-0.74
Region 12	0.239	2.59*	0.113	3.96**
Adjusted R^2	0.311		0.431	
F	47,920		1,575.370	
N	2,394		51,917	

Source: 2000 CASEN Survey.
Notes: This regression considers all non-agricultural workers 15 years and over. Reference dummy variables: 13th Region (Santiago Metropolitan Region); employees.
* *statistically significant at 1%; * statistically significant at 5%.

To better understand the results obtained from estimating equation (1): first, we break down earning differentials between teachers and non-teachers; and second, we simulate earnings predicted by the estimated model, distinguishing between men and women.

Breakdown of Earning Differentials Between Teachers and Non-Teachers

It is an interesting exercise to break down earning differentials, so as to determine to what extent these reflect differences in individual characteristics and the returns on those characteristics. For this purpose we have applied the Oaxaca (1973) decomposition. This can be written as:

$$(2) \qquad Ln(W_T/hr) - Ln(W_N/hr) = \beta_N (X_T - X_N) + (\beta_T - B_N) X_T$$

In other words, the difference predicted by the regression model in the log of hourly earnings between teachers and non-teachers can be decomposed in two parts. One part is explained by the differences in individual characteristics between the two groups (years of schooling, experience, etc.) weighted by the coefficients estimated for non-teachers in the income equation. The other part is explained by the differences in rates of return on each of those characteristics between teachers and other workers.

Equation (2) can be broken down still further. The first term on the right-hand side can be separated into factors relating to personal characteristics (P) and characteristics of the job (J), such as, employee, self-employed or owner, urban or rural, etc. The results from carrying out this exercise are as follows:

$$(3) \qquad Ln(W_T/hr) - Ln(W_N/hr) = \beta^P{}_N \left(X^P{}_T - X^P{}_N\right) + \beta^J{}_N \left(X^J{}_T - X^J{}_N\right) + (\beta_T - \beta_N) X_T$$

The results show that the difference in the log of main-job hourly earnings between teachers and non-teachers favors teachers in both years (0.70 for 1998 and 0.54 for 2000). This is explained by differences in the personal characteristics of teachers, such as years of schooling, holding a professional qualification, etc. (0.81 for 1998 and 0.64 for 2000). Moreover, characteristics that can be attributed to the job rather than to the teachers themselves (mainly occupational category) reduce this differential (-0.14).

The final term in the equation shows the fraction of the earnings differential between teachers and non-teachers attributed to differences in returns on personal characteristics. The result obtained (+0.03 in 1998 and +0.04 in 2000) indicates that teachers receive a little bit more in return for their personal characteristics than non-teachers do.

This result occurs despite the fact that the return on education and experience is lower than for other workers. Several elements combine to explain this situation. First, the

fact that teachers start with higher salaries than other workers with similar characteristics.[21] Second, female teachers' salaries are similar to men's, which does not occur to other women in the labor market. In most occupations women receive lower yields than men for their human capital. Third, unlike other workers, teachers don't earn less because they are single or work outside the Metropolitan Region. All these elements tend to offset the differences between teachers and non-teachers when it comes to their returns on education and experience.

Simulations: Earning Differentials Between Teachers and Non-Teachers

The above results show that researchers must pay attention to differences between men and women when we compare teachers and non-teachers salaries. In this section, we explore the issue in more detail.

Graph 3 presents the differences obtained from the estimated equation (1) in the log of main-job hourly earnings between teachers and non-teachers, for different levels of schooling and potential experience, 1998. Graph 3 (a) presents the case of women and Graph 3 (b) that of men. The simulation for year 2000 is similar, although there is a small improvement for male teachers (see graph A1 in the appendix)[22].

Female teachers with up to 16 years of schooling earn more than female non-teachers for any level of experience. Only female teachers with over 17 years of schooling (with graduate studies) earn less than non-teachers. 64.9% of female teachers receive higher salaries than non-teachers.

For male teachers, the situation is different. Only male teachers with 13 or less years of schooling earn more than male non-teachers for any level of experience. With 14 or 15 years of schooling, they earn more than non-teachers only at the beginning of their working lives and then after many years of experience. Male teachers with 16 or more years of schooling earn less than non-teachers, given their education and experience. Only 21.8% of male teachers receive higher salaries than non-teachers.

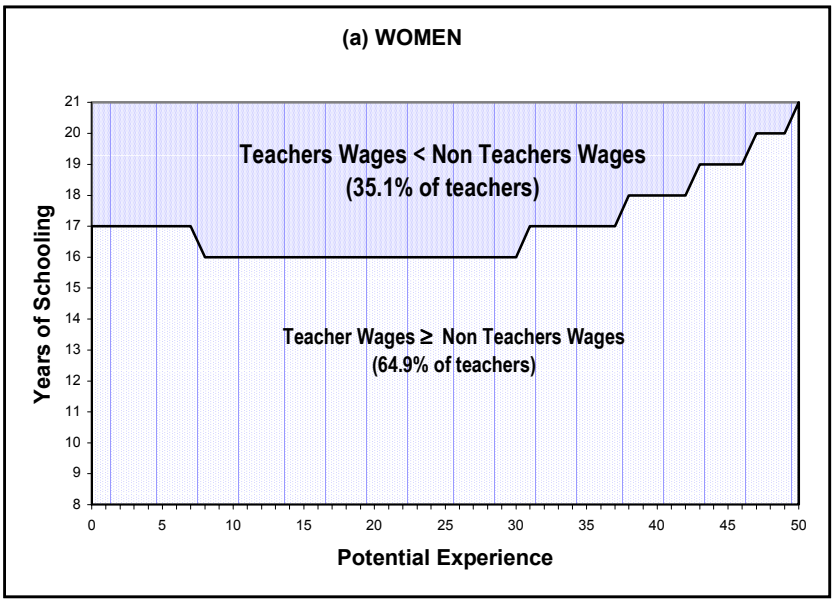
The differences found between men and women reflect the fact that there is no discrimination against women in the teaching profession,[23] as is the case for the rest of the labor market in Chile.

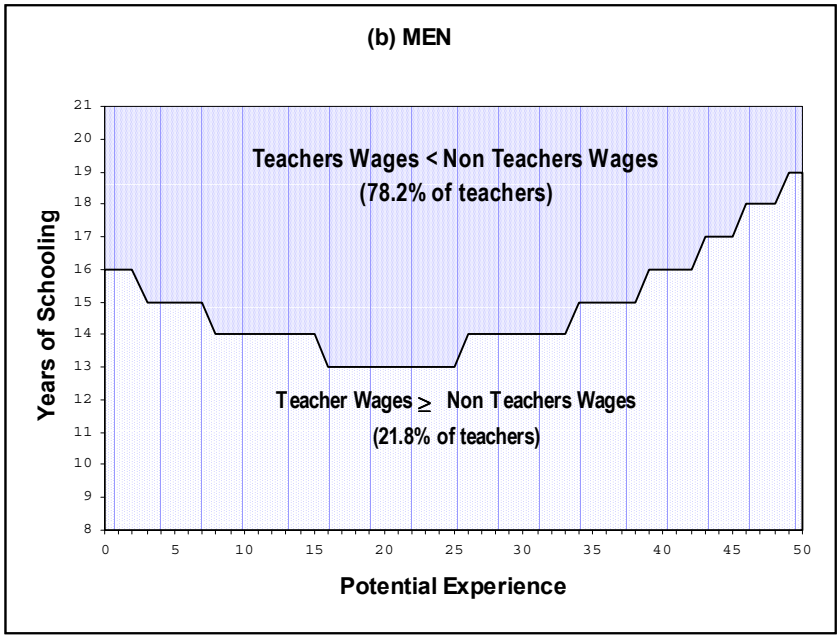
[21] This is reflected in the constant term of the estimated model, see Tables 7 and 8.

[22] The figures start at eight years of education because there are teachers trained at normal schools with that level of education; see table A5 in the appendix.

[23] This lack of discrimination can be better explained by the regulated pay scales intended to ensure teachers' pay equity than by the fact that the teaching profession is a female-dominated occupation. Verdugo and Schneider (1994) examine earning differentials between male and female teachers in the US and find that the latter appear to experience wage discrimination. The cost associated with being a woman is approximately 5% of their average annual salary.

Graph 3
Simulations for Teachers versus Non Teachers. 1998





VI. Incentives Embedded Within Teacher's Salary Structure

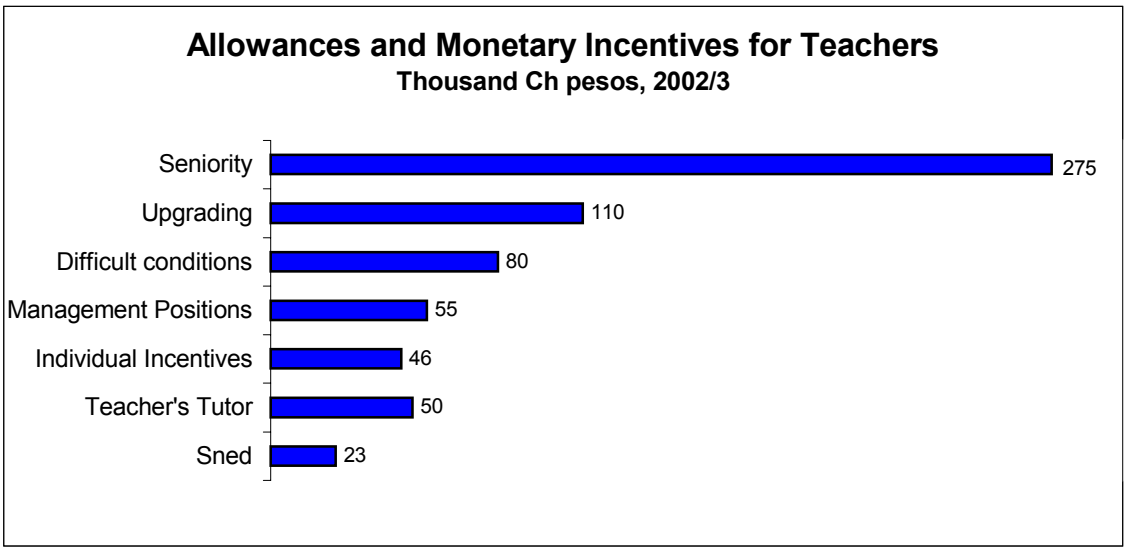
The previous section shows that the basic issue regarding teachers' salaries in Chile is not their average level but the fact that salaries are exceptionally uniform from one teacher to another. Our analysis reveals that this occurs because the returns on education and experience are low, comparably speaking, for teachers.

In this sense, it is interesting to permit a more flexible salary structure, in which part of salaries depends on teachers' performance. This can decompress teachers' salary structure, allowing the government to pay better salaries to those who perform better.

Since 1996, Chile has had a mechanism, the National System of Performance Assessment (SNED), which makes it possible to adjust teachers' salaries to their performance in the country's publicly financed schools. This is a collective incentive open to all schools receiving government funding, whether municipal or private subsidized.

The amount of money teachers receive under the SNED, however, is the lowest of all the monetary incentives to which they can aspire. Below we compare the average increase received by a teacher at a school with a SNED award, of 23,000 Chilean pesos per month, with other available incentives. In each case, the *maximum* amounts of the allowances are compared (Figure 3).

Figure 3



Source: Cox (2003)
Note: In each case the maximum amount of the allowance is considered

It is interesting to note that since 2002 there have been two incentives to reward individual excellence among teachers: an individual allowance for teaching excellence and the teacher of teachers' program. In the case of the former, teachers must voluntarily participate in having their files evaluated and take a test of their knowledge; teachers

receiving the reward receive double the SNED award, that is, 46,000 pesos per month.[24] If the teacher is willing to participate in peer training, moreover, he or she may receive an additional 50,000 pesos per month.

Despite the recent appearance of these collective and individual performance incentives, the most important incentive offered to teachers is seniority: a teacher with 30 years of service receives an additional 275,000 pesos per month, for this simple fact. The second most significant incentive is the pursuit of further professional training, in which case teachers' monthly income may increase by 110,000 pesos. If teachers are willing to work in difficult conditions, for example in geographic isolation and/or with poor and marginal students, they receive an additional 80,000 pesos per month. Finally, if teachers leave the classroom to assume management or technical positions, their monthly income rises 55,000 pesos.

To clearly demonstrate the importance of different wage incentives to the average teacher working in the municipal sector, Table 10 presents the relative importance of the different kinds of bonus in 2003; in each case, except for the basic national wage, the allowance has been calculated as the total amount of money allocated to the municipal sector for this purpose, divided by the total number of municipal teachers.[25] The first noteworthy element here is how complex the salary structure is.

Table 10
Breakdown of the Wage of an Average Municipal Sector Teacher, 2003

Concept	Percentage (%)
Basic National Wage (RBMN)	42.5
Experience allowance (20 years)	28.4
Responsibility allowance	1.7
Difficult conditions allowance	3.4
Training allowance	5.3
Regional complement	5.5
Additional salary	1.7
Law 19,200 taxable bonus	2.5
Professional Improvement Unit (UMP)	2.4
Complementary UMP	0.6
Proportional bonus	5.1
Excellence bonus (SNED)	0.9
Total	100.0

Source: Ministry of Education. See table A1 in the appendix for more details.

It can be concluded that despite the inclusion of performance incentives, traditional incentives continue to be extremely important to Chilean teachers' salaries. Seniority is the

[24] See Table A1 in the Appendix for more details on the amounts paid for this purpose.
[25] For instance, in the case of the SNED around 27% of municipal teachers receive the award, but the figure (0.9%) in Table 10 assumes that the total amount of excellence bonus allocated to municipal teachers is divided by the total number of municipal teachers.

main way of increasing income, which ultimately means that loyalty rather than actual job performance is rewarded in the teaching profession. Undoubtedly, this situation has limited the SNED's ability to effectively change teachers' behavior.

Nonetheless, recently some significant changes have occurred, which have boosted the importance of variable performance-linked salaries.

Specifically, in 2003 during the last round of collective bargaining between the teachers' association and the Ministry of Education, both parties agreed that salary increases would be variable and assigned through the SNED, an agreement that became Law 19,933 and came into effect on 12 February 2004. Because of this, in the next section we describe this system in more detail, along with the changes that will take place in coming years. This process also established a new individual incentive for rewarding those with distinguished or competent skills under individual evaluation processes currently underway (in contrast to the teaching excellence bonus, this evaluation is compulsory, see Table A1 in the appendix). It is nonetheless important to point out that the only evaluation underway that links teachers' salaries to students' performance is the SNED.

VII. Impact of the SNED on Schools' Academic Achievement: A Preliminary Evaluation[26]

In this section first we describe the SNED, and then we estimate its impact on schools' academic achievement after the first four applications. This is a preliminary study, so the results presented here are still of an exploratory nature.

The SNED rewards teachers' performance and seeks to improve their motivation. The schools that perform with excellence are chosen every two years and receive an excellence bonus as an incentive; the bonus is defined on a per student basis, so the amount each school receives depends on the number of students in attendance. Schools representing up to 25% of each region's enrolment receive awards. It has been established that 90% of the amounts assigned must go directly to the school's teachers, in proportion to their hours of employment, while each school decides the distribution of the remaining 10%.[27] The SNED has been applied four times since 1996[28].

On average, 20% of the schools and around 27% of teachers received awards in the different applications of the SNED. These figures varied for each year (see Table 11).[29] The subsidy for excellence that teachers received during 2002-03 was 279,000 pesos per year (US$439.4),[30] slightly more than the $219,000 they obtained in 1996 when the system

[26] This section is based on Mizala, Romaguera and Henríquez (2004). More details on the SNED can be found in Mizala and Romaguera (2002a).
[27] The excellence subsidy is defined on a per student basis, so the amount each school receives depends on the number of students in attendance.
[28] In March of this year, the results from the fifth application SNED were published.
[29] 50.9% of schools have never received the award; 27.7% have won once, 13.7% twice, 5.8% three times and just 1.8% every time the SNED has been applied.
[30] This amount is paid quarterly during a period of two years.

began. This figure currently amounts to 87% of the minimum monthly salary for teachers and a little more than an additional half salary per year for a teacher working 36.3 hours per week. In terms of a salary increase, this ranged from 7.2% per year among those receiving the teachers' minimum wage to 4.7% for those earning an average salary for 36.3 hours per week. As it was already mentioned, the additional income involved in the award is relatively low and this could seriously limit the impact of this policy on teachers' behavior.

Table 11
SNED: Beneficiaries and Resources

	1996-97	1998-99	2000-01	2002-03
Schools receiving awards	2,274	1,832	1,699	1,863
% of schools receiving awards	-	20.2	18.4	19.7%
Teachers receiving awards	30,600	31,400	32,600	34,400
% teachers receiving awards	-	27.3	27.7	27.7
Excellence subsidy per teacher (annual in 2001 US$)	345.2	364.4	428.3	439.4
Total SNED budget (thousand of 2001 US$)	10,563	11,442	13,963	15,115

Source: Ministry of Education, Chile
The average exchange rate in 2001 was 634.9 Chilean pesos per US dollar

The changes covered by the law recently approved by Congress significantly increase the excellence subsidy paid per student and therefore the average annual amount that teachers at prize-winning schools will receive. Table 12 shows that the amount of the per student excellence award will rise 91% between 2004 and 2006, which means that teachers working in a SNED prize-winning school will receive about double what they are receiving today for this reason.

Table 12
Trends in SNED Award Amounts
(US$ 2001)

Years	1996-97	1998-99	2000-01	2002-03	January 2004	January 2005	January 2006
- per student excellence subsidy	1.27	1.39	1.60	1.63	1.79	2.77	3.42
- average annual amount for award-winning teachers	345.2	364.4	428.3	439.4	512.8*	827*	n.a.

Source: Ministry of Education, Chile
(*) Based on the number of teachers that will receive the SNED award during 2004-05
The average exchange rate in 2001 was 634.9 Chilean pesos per US dollar

At the same time, the law establishes that more schools and teachers will receive awards, since the share of regional enrolment covered by awards will rise from 25% to 35% in 2006. Schools ranking in the upper 25% of regional enrolment will receive 100% of the excellence subsidy, while those in the next 10% will receive 60% of the excellence subsidy.

The impact of the SNED on schools' academic achievement

To evaluate the SNED's impact there are several methodological challenges to be dealt with. In the first place, all Chilean schools receiving state funding participate in it by definition, with no need to compete formally, so no schools are available for a comparison group. Because of this, the only feasible design to evaluate the SNED's impact in schools is a reflexive comparison.[31]

Secondly, there is a problem of endogeneity, because we are trying to evaluate its impact on schools' academic achievement, but this is precisely one of the main variables considered (with a weight of 65%) to calculate the SNED index, which ranks schools and selects those to receive awards (Table A6 in the appendix provides the indicators used to calculate the SNED index).

At the international level, some studies have estimated the impact of accountability systems associated with incentive payments, among them, Ladd (1999), Lavy (2002a) and (2002b), and Henry and Rubinstein (2002). In Chile's case, there are virtually no studies evaluating the SNED's impact on educational achievement. One exception is Contreras et al. (2003), which analyses the effect of the 1998-1999 SNED application on schools' educational achievement, measured by the results obtained on the 2000 SIMCE test. Using ordinary least square (OLS) estimates and the matching propensity score method, they find that the SNED's increased SIMCE scores by an amount that fluctuates from four to 18

[31] In a reflexive comparison, the counterfactual state is given by the pre-program participation of participants (prefactual scenario). See Grossman (1994), Regalia (1999), Heckman and Smith (1995), Ravallion (2001), Duflo (2002).

points. However, Contreras et al. (2003) do not correct for the problem of endogeneity when estimating the SNED effect on schools' academic output, so his results might be biased.

The problem of endogeneity is common when evaluating programs and the literature reveals different attempts to resolve it. The most widely used solution is the use of instrumental variables, which would mean, in the SNED's case, finding a variable highly correlated to winning the SNED award, but not with the school's ability to obtain high scores on the SIMCE test. The problem is that it is not easy to find the right instrumental variable and the use of variables that do not totally satisfy the requirements leads to biases greater than those already existing.[32]

An alternative strategy for dealing with the problem of endogeneity is to estimate a model with fixed effects for each school, which makes it possible to model its heterogeneity. Schools fixed effects can vary or not over time, but in this case we consider only schools fixed effects that do not change over time, and therefore, there may still be biases due to changes not controlled by the fixed effects.

In this case, we are working with a general fixed effect model that makes it possible for the (SNED) policy effects and biases to vary over time. Traditional fixed effect models, which assume coefficients that are constant over time and a bias due to the also constant non-random selection of schools, can be nested in this more general model.

Although in the SNED's case it could be assumed that the treatment effects are the same every year, since the methodology applied (at least in the last three applications), and even the resources allocated, have not changed significantly. This means that the same program has been applied every two years. However, eventually schools' awareness of the SNED, its reception and level of acceptance may change over time and that would make a different impact for each period possible.

Moreover, the traditional fixed effect model assumes a constant bias due to the non-random selection of schools, based on fixed characteristics. This tends to be true in the SNED's case, because schools that perform well tend to always receive rewards, just as there are schools that have never received awards and probably will not in the future. Moreover, criteria for awards have remained stable over time. Therefore, it would seem that the assumption holds true in the SNED's case; nonetheless, as in the previous case, it might be interesting to consider a model that relaxes this restriction, assuming instead that the criteria for allocating the awards changes between applications.

[32] In the SNED's case, it is natural to think of the other SNED index factors as instrumental variables. This works only if one seeks to evaluate the impact of the SNED of one period on achievements of the next period. However, on considering an analysis of several periods, it becomes difficult to use these other SNED indicators, because they are all relative to each application and are not comparable (in value) from one period to another.

The advantage of using this kind of model is that the different SNED applications can be considered in a single regression, producing more precise and robust estimates than other methods, such as the difference in difference method.

The Model[33]

We consider the following production function type model for evaluating the SNED's impact on schools' educational achievement (effectiveness, measured by SIMCE scores):

$$E_{st} = \alpha_t' X_{st} + \beta_t' SNED_{s,t-1} + \gamma_t' C_s + \delta_t F_s + \varepsilon_{st} \quad (4)$$

Where:

E_{st}:	Effectiveness of school *s* over time *t*.
X_{st}:	Characteristics of school *s* over time *t*.
$SNED_{s,t-1}$:	SNED award (dummy variable) of school *s* over time *t-1*.
C_s:	Unobservable fixed characteristics of school *s*.
F_s:	Observable fixed characteristics of school *s*.

This model assumes that the unobserved fixed effect of school s (C_s) does not correlate with the error term (ε_{st}), although it may correlate with other characteristics of the school, whether fixed (F_s) or variable (X_{st}). Our main interest is in the relationship between unobservable characteristics (C_s) and the SNED selection variable ($SNED_{st}$). Note that the model considers the effect of the SNED award from the previous period, because when the next period starts the granting of the award has been completed.

Based on the assumption that C_s can be correlated with the $SNED_{st}$ variable, we can model the SNED's impact on unobservable school characteristics as follows:

$$C_s = \lambda_1 SNED_{s0} + \lambda_2 SNED_{s1} + \lambda_3 SNED_{s2} + \xi_{st} = \lambda' SNED_s + \xi_{st} \quad (5)$$

where t = 0, 1, 2 refers to the 1996-97, 1998-99 and 2000-01 SNED application periods. Note that the coefficients λ_j may vary with the period, thus incorporating the possibility that schools' unobservable characteristics affect the award differently in each period, thereby incorporating a bias in estimated effects that may vary over time.

[33] Jakubson (1991) uses this model to estimate unions' effects on salaries; Tokman (2002) meanwhile uses a similar model to analyze the effects of the P900 program on schools' educational performance.

Substituting the expression for $\subset_s$ from (5) in (4), we get the following specification:

(6) $$E_{st} = \alpha_t' X_{st} + \beta_t' SNED_{s,t-1} + \gamma_t' \lambda'_s SNED_s + \delta_t F_s + (\gamma\xi + \varepsilon_{st})$$

in which γ and λ together determine the bias.

Specification (6) is a restricted version of the following more general model:

(7) $$\underline{E}_s = \Phi \underline{X}_s + \Pi \underline{SNED}_s + \underline{e}_s$$

where:

$$\underline{E}_s = \begin{bmatrix} E_{s1} \\ E_{s2} \\ E_{s3} \end{bmatrix}, \quad \underline{X}_s = \begin{bmatrix} F_s & X_{s1} \\ F_s & X_{s2} \\ F_s & X_{s3} \end{bmatrix}, \quad \underline{SNED}_s = \begin{bmatrix} SNED_{s0} \\ SNED_{s1} \\ SNED_{s2} \end{bmatrix} \text{ and } \underline{e}_s = \begin{bmatrix} e_{s1} \\ e_{s2} \\ e_{s3} \end{bmatrix}.$$

depending on the assumptions, we have different specifications of the matrix II and therefore, different specifications of the model (7). In particular:

(i) If we consider that the SNED effect, the effect of unobservable characteristics and biases change over time, then the coefficients β_j, γ_j and λ_j are different for each period, yielding the following specification for Π, which corresponds to equation (3):

(8) $$\Pi = \begin{bmatrix} \beta_1 + \gamma_1\lambda_1 & \gamma_1\lambda_2 & \gamma_1\lambda_3 \\ \gamma_2\lambda_1 & \beta_2 + \gamma_2\lambda_2 & \gamma_2\lambda_3 \\ \gamma_3\lambda_1 & \gamma_3\lambda_2 & \beta_3 + \gamma_3\lambda_3 \end{bmatrix}$$

(ii) If we consider that the SNED effect (β_j) is the same for each period, but the effect of unobservable characteristics and biases changes over time, then the coefficients γ_j and λ_j are different for each period, yielding the following specification for Π:

$$(9) \qquad \widetilde{\Pi} = \begin{bmatrix} \beta + \gamma_1\lambda_1 & \gamma_1\lambda_2 & \gamma_1\lambda_3 \\ \gamma_2\lambda_1 & \beta + \gamma_2\lambda_2 & \gamma_2\lambda_3 \\ \gamma_3\lambda_1 & \gamma_3\lambda_2 & \beta + \gamma_3\lambda_3 \end{bmatrix}$$

To evaluate the admissibility of these different restrictions we can use minimum distance estimators (Chamberlain, 1982 and 1990) and estimate parameters using GLS with (non-linear) restrictions.

As mentioned, the models estimated use effectiveness as a dependent variable. This variable is defined as a valid average[34] of each school's score on the SIMCE tests closest to the year being considered.[35] The explanatory variable is whether or not the school won a SNED award and the control variables are school characteristics, such as: socioeconomic level (measured using an index that combines parental income, household income and the JUNAEB vulnerability index), size (measured by enrolment), if the school has a full school day (*Jornada Escolar Completa*), if it participates in other programs such as the P900, educational level (primary or secondary), location (urban or rural), gender, region where it is located, type (municipal or private subsidized), effectiveness in previous years (we used 1996 as our base year).[36]

These variables are available for each school in a panel type data set, where the observations correspond to schools that have participated in all SNED applications since 1998 and have taken the SIMCE tests so they have data for the effectiveness variable.

The model is estimated for a subset of schools that, in the different SNED applications, come close to the cut-off value for receiving an award according to the SNED index. These schools compete against each other for the SNED prize and therefore it is expected that the SNED will imply a change of behaviour increasing their effort to improve school's effectiveness. The selection criteria used was to consider those schools that in some SNED application have held a place in the ranking of their homogeneous group within a range defined as the SNED index cut-off value plus or minus one-third of a standard deviation of the SNED index of their group.[37] This yields a panel type data set

[34] A valid average is defined as the average of scores for the tests the school must submit to, depending on the school type.

[35] It is important to note that the effectiveness variable included in the SNED index for time t and the effectiveness variable used in the model (E_{st}) are not the same, although in each period one of the tests is included in both indicators.

[36] Finally, given the possibility that "noise" in the results of standardized tests may limit their use in school rankings and in accountability systems (Kane and Staiger; 2002 and Chay, McEwan and Urquiola; 2003), we analyze to what degree the effectiveness variable may present more variability in smaller schools; however, the effectiveness variable is similar in every decile of school size, see Table A7 in the appendix. This may reflect the fact that the effectiveness variable includes language and mathematics tests given to different grades (4^{th}, 8^{th} and 10^{th}) in different years.

[37] The SNED compares and ranks schools within homogeneous groups, calculated as a function of their location, level of education and students' socio-economic characteristics. Schools compete to win the prize only within their homogenous groups and despite a change in the methodology used to build homogeneous

with 1610 schools. Table A8 in the appendix provides descriptive statistics of the variables for these schools.

The estimates presented below consider the impact of SNED applications from 1996-97 through 2000-01. The 2002-03 application is not included because they should be reflected in tests conducted after 2002, information that is not yet available. This means that the SNED impact on effectiveness over time t corresponds to that which would result from winning an award over time t-1.

Table 13 presents the results from estimating the unrestricted model (7), given that there are statistically significant elements outside the diagonal, the data validates the specification of model (6).

Table 13
SNED's Impact on Effectiveness
(Unrestricted GLS)

	Effectiveness 1998		Effectiveness 2000		Effectiveness 2002	
	Coefficient	Est. error	Coefficient	Est. error	Coefficient	Est. error
1996-97 SNED	-0.468	0.536	0.710	0.607	0.913	0.685
1998-99 SNED	-1.734***	0.542	-0.994	0.613	-0.939	0.692
2000-01 SNED	8.899***	0.490	2.756***	0.555	3.270***	0.625

Note: * Statistically significant at 10%; ** Statistically significant at 5%; ***Statistically significant at 1%.

Models with restrictions are then estimated, starting with those that include non-linear restrictions among the coefficients, allowing different values for β, λ and γ (specification 8 in matrix Π). This estimation leads to the conclusion that only the 2000-01 SNED had a positive impact on effectiveness, with the effect of the other two applications being nil (Table 14 upper section).

The bias due to the presence of unobserved schools fixed characteristics is significant for some periods. The correlation between the selection of SNED award-winning schools and unobserved school characteristics has not a clear pattern: this is positive for the latest SNED (2000-01), negative for the 1998-99 SNED, and insignificant for the first SNED.[38] Meanwhile, the effect of schools' unobserved characteristics on effectiveness is positive for the second SNED application and not significant for the third (Table 14)[39].

groups between the first and second SNED application, the classification within a homogeneous group remained relatively stable; in the 2002-03 version of the SNED 109 homogeneous groups were constructed.

[38] A positive and significant λ coefficient means that the SNED tends to select schools that perform better than the others, after controlling for the observed characteristics.

[39] A positive and significant γ means that schools' unobserved characteristics tend to increase their effectiveness.

Table 14
SNED Impact on Effectiveness
(1610 schools)

		β_1	β_2	β_3	λ_1	λ_2	λ_3	γ_2	γ_3
Non-linear restrictions on coefficients	Coeff.	0.0727	0.2652	2.5883	-0.8189	-1.6101	8.9477	0.2753	0.0106
	Est. error	1.9328	0.5576	3.0571	1.9525	0.5221	0.4763	0.0586	0.3377
	Signif.			*		***	***	***	
	$\chi^2(1)$	7.56							
		β			λ_1	λ_2	λ_3	γ_2	γ_3
Constant SNED coefficient: Single impact of the program	Coeff.	0.7576			-1.3708	-1.7387	8.7119	0.2235	0.0752
	Est. error	0.5260			0.7293	0.5149	0.4758	0.0582	0.0900
	Signif.	**			**	***	***	***	
	$\chi^2(3)$	14.14							

Note: * Statistically significant at 10%; ** statistically significant at 5%; ***statistically significant at 1%.

The model whose results are reported in the lower part of Table 14 assumes that the SNED's impact on effectiveness is independent of the year in which it was implemented (specification 9 in matrix Π). In this case we obtain a positive and significant coefficient, so there is a joint positive impact of the three SNED applications considered. This means that the SNED has a combined positive impact on these schools educational achievement.

Similarly, the assumption of constancy over time is rejected for the effects of unobserved characteristics on effectiveness and the correlation between these unobserved characteristics and the SNED award. The validity of the traditional fixed effect model is also rejected.

This is a first attempt to asses the effect of the SNED on schools' academic performance. More research is required in order to obtain consistent and robust results, in particular, it is necessary to consider several elements. First, the methodology for measuring the impact of this kind of policy must be improved, to deal with the problems implicit in the lack of a control group and endogeneity. Second, data from the most recent SNED application must be included, since obtaining reliable results requires lengthy time series, particularly given that the SNED was not at first widely publicized among schools. Third, it will be interesting to be able to evaluate the SNED's impact once the amounts allocated rise in 2005 and again in 2006, when its coverage will rise to 35% of each region's enrolment. This is important because, as mentioned, today the SNED offers only a modest monetary incentive to which teachers can aspire.

VIII. Evaluating Performance and Incentives: Teachers' and Principals' Perception

Despite the fact that, compared to other monetary incentives to date the SNED is not very significant, it has affected teachers' attitudes. In fact, today teachers seem more open to performance evaluations and the associated monetary incentive payments. This explains to a large degree why the teachers' association agreed to increase the variable portion of

performance-linked salaries. Likewise, it is possible that the experience with the SNED facilitated the agreement reached in 2000, in which individual performance evaluations were accepted as a criterion for teaching careers.

Several surveys of teachers reveal this change in teachers' traditional resistance to evaluation systems.

A first survey was done of a random sample of Greater Santiago teachers, to find out what they thought of the educational system, including some questions about the SNED.[40] In terms of their acceptance of performance evaluations and awards, responses were positive. There was a high degree of consensus among teachers.

- 74.7% of teachers agreed or strongly agreed with the statement that the Ministry of Education should apply a performance evaluating mechanism to subsidized private and public schools.
- 87.6 % of teachers agreed or strongly agreed with the statement that it is important to recognize schools that perform better than others.

There was less agreement, although still more than half, with statements about the effect of the excellence award on the quality of education and therefore the link between salaries and evaluation.

- 55.6% agreed or strongly agreed with the statement that the excellence award for performance contributes to improving the quality of education.
- 58.3% agreed or strongly agreed with the statement that the rise in teachers' salaries should be linked to an evaluation of their teaching.

Similarly, national surveys done by the *Centro de Investigación y Desarrollo de la Educación* (Center for Educational Research and Development, CIDE) confirm the idea that teachers have greater acceptance of performance evaluations. In the first survey, conducted in 1999, 78.6% of teachers strongly agreed with an individual evaluation of teaching performance. In the second survey, conducted in 2000, 1,060 teachers were surveyed, with 70.3% saying they strongly agreed with individual evaluation of teaching performance. If replies are broken down by type of school, the data reveals that 62% of municipal school teachers, 76.7% of private subsidized school teachers, and 84.8% of private fee-paying schools teachers agree with individual performance evaluations (Mella and Ostoic, 2001). In the fourth survey in 2003, of 1,154 teachers, 64% of those surveyed indicated they agreed with implementing a teaching performance evaluation system that included incentives and sanctions. Again the strongest agreement was among private fee-paying schools (75%), followed by private subsidized schools (63%) and finally municipal schools (58%) (CIDE, 2003).

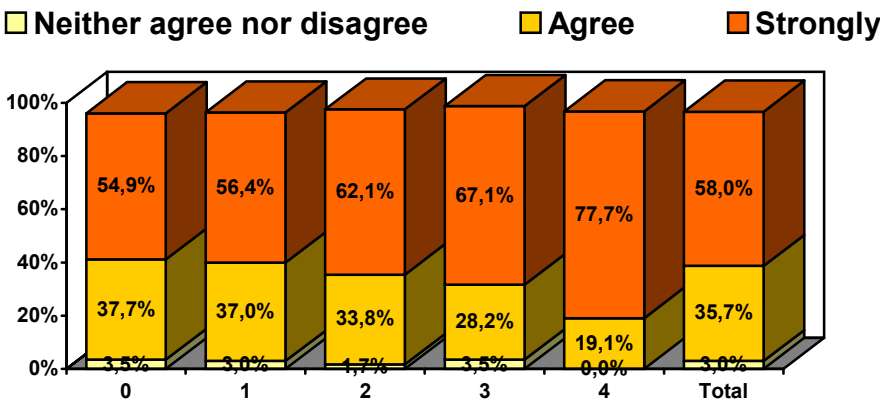
[40] Field work took place from 26 November 1998 to 6 January 1999, using surveyors. A random selection of 400 teachers in Greater Santiago was selected in two stages: (i) randomly selecting 50 award-winning schools and 50 schools that had never received the SNED award (42 municipal schools and 58 subsidized private schools); (ii) four teachers per school were selected at random. 355 teachers were actually interviewed (48 award-winning schools and 50 with no award).

Moreover, a volunteer survey of principals of private subsidized and municipal schools in Chile, with responses from 3,579 out of 9,684 schools, found significant support for performance evaluations and performance-related monetary incentive payments.[41] Moreover, most principals indicated that it is very useful to their work as principals to have a monetary reward for teachers associated with school performance.

Figures 4, 5 and 6 present these results, according to the number of times the school has obtained the SNED award. Note that the answers tend to be more positive the more times the school has received the reward. Nonetheless, even principals of schools that have never won the SNED show considerable acceptance of performance evaluations and payment of monetary incentives, 78.5% consider this policy rather useful or very useful to their work as principal (Figure 6).

Figure 4

I agree or strongly agree with MINEDUC regularly evaluating schools receiving state subsidies (% schools by number of times they have won the SNED award)

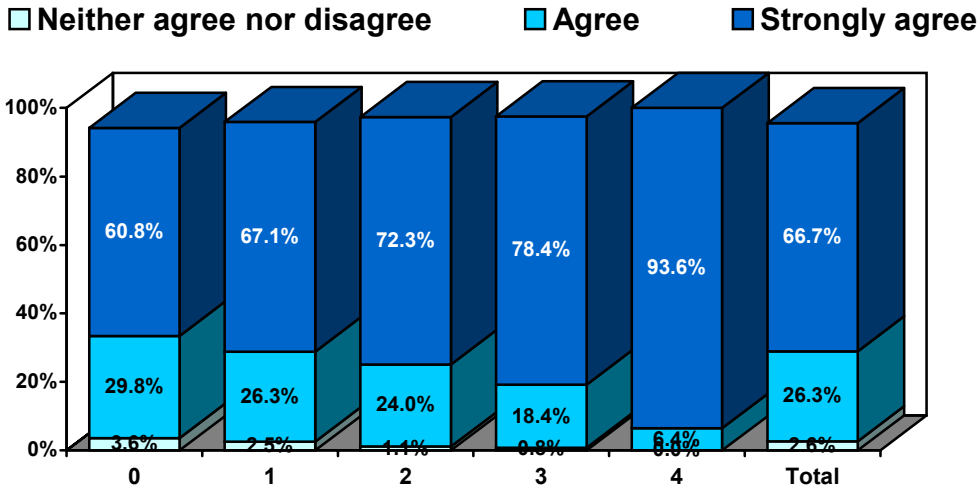


Source: MINEDUC
Note: Other response options were: strongly disagree, disagree

[41] Although this survey design with volunteer participation implies self-selection of those responding, no bias is apparent upon comparing those who answered compared to total schools. Characteristics compared were: the region where the school is located, type (public or private), level of education (primary or secondary, adults, pre-school, etc.). Although the respondents' sample is slightly skewed in favor of schools that have received an award, this deviation is not worrisome (see Table A9 of the appendix).

Figure 5

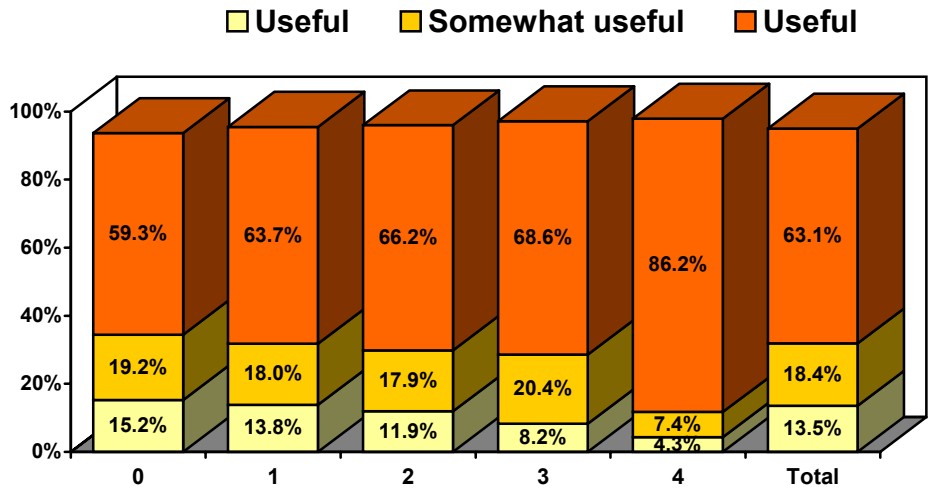
I agree or strongly agree that the MINEDUC should provide resources for regularly rewarding the best performing schools (% schools, by number of times they have won the SNED award)



Source: MINEDUC
Note: Other response options were: strongly disagree, disagree

Figure 6

It is Very useful / Somewhat useful / Useful to principal's work that there is a monetary award to teachers, associated with school performance, financed and designed to MINEDUC standards (% schools, by number of times they have won the SNED award)



Source: MINEDUC.
Note: Other response options were: not useful at all, not very useful.

IX. Conclusions

In this paper we have tried to look at teachers' salaries in Chile and the incentives available to teachers from different perspectives. We have analyzed the evolution and structure of teachers' salaries, along with differentials that may exist compared to other professionals with similar characteristics.

It is important to underline that most of the information available refers to salaries paid in the municipal sector, since there is no data on the private sector, because these salaries are negotiated at the individual school level. The only information on this sector is the starting salary and some allowances that are valid for teachers in both public and private sectors.

This analysis makes it possible to conclude that early in the 1990s, with the return of democracy, teachers' salaries rose significantly in real terms, over and above the average wage of the economy and more than the average salary for professionals. This is also apparent in teachers' starting salary, which has risen by more than the minimum wage within the economy.

This rise in salaries may be one reason behind the turnaround in the number of students going into education and their scores, as both have risen significantly since 1998.

Given that comparing teachers' and other workers' salaries may not be appropriate, due to the differences in human capital involved, we also carried out an econometric analysis that allows us to compare similar workers. This analysis showed that, on average, teachers' earnings are similar to those of non-teachers with the same characteristics. However, the earnings profile for teachers is different from that of other workers, because of how teachers' salaries are calculated, especially for those in municipal schools. The return on schooling and having a professional degree, while statistically significant, is lower for teachers than for other workers, and the same thing happens with the return on experience.

Moreover, the income profile for teachers starts at a higher point than for other similar workers, but is flatter. Thus, teachers with less education and experience earn more than they would in other sectors, while teachers with more education and experience earn less than similar workers in other occupations.

This salary structure suggests that teaching probably attracts people with a preference for job stability, and discourages the entry of people willing to take more risks. In this sense, even more educated teachers would not necessarily be underpaid, but rather could be accepting a compensatory differential in exchange for job stability and security.

Similarly, we analyzed the incentives embedded in teacher's salary structure, finding that despite the recent appearance of collective and individual performance

incentives, the main incentive to teachers continues to be seniority and professional training. The SNED is the oldest of the performance evaluation-linked to monetary incentives and the only one that uses students' academic achievement as the basic criterion. This currently accounts for a small percentage of teachers' average monthly salary.

Preliminary estimates reveal that the SNED has had a positive impact on educational achievement in those schools that have been involved in its different applications and are close to (higher or lower than) the cut-off point between SNED award winners and losers. For this group of schools it can be concluded that, on one hand, the impact of an individual SNED (2000-01, the most recent one considered) is significant, and, on the other, that there is a cumulative impact from the different SNED applications on schools' academic achievement.

Also, the SNED has had an impact on teachers' attitudes. In fact, teachers today are more open to performance evaluation and the payment of monetary incentives linked to it, and principals consider evaluations and monetary incentives useful in carrying out their labors.

This explains to a large degree why the teachers' union (*Colegio de Profesores*) recently accepted a proposal to boost the variable part of salaries linked to performance. The experience with the SNED made it easier to reach agreement in 2000 of including voluntary accreditation of classroom skills, which is associated with a payment (pedagogical excellence allowance). Similarly, in the recent round of collective bargaining in 2003, parties agreed to create an allowance to reward those qualified as distinguished or competent in their compulsory individual performance evaluation, and who demonstrate their disciplinary and pedagogical knowledge in a written test. They also agreed that part of wage increases will be variable and be allocated through the SNED. This means that from now until 2006, the monthly amount received by teachers working at a SNED-winning school will double. At the same time, the percentage of school enrolment receiving an award will rise from 25% to 35%, which means that more teachers and schools will receive this monetary incentive. It will be interesting to assess the SNED's impact on schools' academic performance after these changes have been implemented.

These changes are very important because they represent significant progress toward a more flexible salary structure, in which part of salaries depends on teachers' performance. This would decompress teachers' salary structure, allowing the government to pay better salaries to those who perform better. This wage policy would also encourage better candidates to enter and remain in the teaching profession.

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APPENDIX

Table A1
Teachers' Salary Allowances in the Chilean Municipal Sector, 2004
(Ch pesos, 2004)

Concept	Amount or percentage
Basic National Wage (RBMN) (hourly rate times number of hours contracted) (*)	6,809 pesos and 7,166 pesos per hour for elementary and secondary education, respectively
Experience allowance	Up to 100% of the RBMN with 15 two-year periods or more
Training allowance	Up to 40% of the RBMN.
Allowance for working in difficult conditions (*)	Up to 30% of the RBMN.
Responsibility allowance (managerial and technical-pedagogical)	Up to 20% of the RBMN for managerial responsibility and up to 10% for technical responsibility
Zonal complement	% of RBMN under DFL N° 249 Interior Ministry
Additional remuneration	Pay shortfall arising from application of the Teachers' Statute; only for those who were already in the system in 1991.
Professional Improvement Unit (UMP) (*)	Bonus of fixed amount for every teacher working in a subsidized school, the amount is 580 pesos per hour (17,390 pesos for 30 hours)
Complementary U.M.P. (*)	Bonus for municipal teachers with 6 to 15 two-year periods. The maximum amount is 338 pesos per hour (10,130 pesos for 30 hours)
Proportional bonus (*)	Variable bonus resulting from the distribution of a % of the increase in the state subsidy according to contractual working hours
Total minimum income	Current amount is 417,735 pesos for 44 hours
Allowance for rural teachers with managerial responsibilities	For rural teachers with managerial responsibilities in multilevel schools. 2,500 teachers receive this allowance, the monthly amount is 59,799 pesos.
Excellent performance bonus (SNED) (*)	The monthly amount is 1,190 pesos per student (0.0958 of the per-student subsidy, USE)
Pedagogical excellence allowance AEP (*) (created during 2000 collective bargaining round)	For accredited teachers: currently 312 receive this allowance. The monthly amount can be 37,000 pesos, 41,800 pesos, 45,000 pesos or 46,000 pesos, depending on professional experience
Variable allowance for individual performance for classroom teachers (created during 2003 collective bargaining round)	For classroom teachers qualifying as distinguished or competent in their individual performance evaluation and who demonstrate their disciplinary and pedagogical knowledge in a written test. The amount considered is 25% of the RBMN for those considered excellent and 15% for those considered competent. This allowance will last 4 years and can be renewed.
Collective allowance for teachers with managerial responsibilities (created during 2003 collective bargaining round)	This allowance will be given annually according to how fully pre-established goals for school management have been met. These goals will be set in a performance contract signed by the managerial team and the "owner" of the school. The amount considered is 15% of the RBMN if 90% or more of goals are met and 7.5% of the RBMN if between 75% and 90% are met.

Source: Ministry of Education, Chile
Notes:

- (*) These subsidies and allowances are also applicable to subsidized private schools.
- Some municipalities have other local allowances for teachers.
- The relevant exchange rate is 584.3 pesos per US dollar

Table A2
Studies about Teacher's Salaries in Latin America

Author	Countries	Data	Conclusions
Psacharopoulos, 1987	Brazil	1980 Census data	Primary school and university teachers were underpaid compared to workers in other professions, while results for secondary teachers were mixed.
Psacharopoulos et al. 1996	12 L.A. countries[a]	Household survey data	No clear pattern: in some countries teachers earn more than the comparison groups (persons over 15 years of age employed in the public and private sectors, excluding agricultural workers), and in others the opposite is true.
Mulcahy-Dunn and Arcia, 1996	Ecuador	Household survey data	Teachers receive equal pay compared to other professional people with similar characteristics
Vegas, Experton and Pritchett, 1998	Argentina	Household survey and the 1994 National Teachers' Census	Over one-third of teachers earn incomes that are lower than they would earn in other occupations. However, teachers' comparative earnings vary greatly across cities.
Piras and Savedoff, 1998	Bolivia	Household surveys	Teachers' hourly earnings in 1993 were comparable to or better than those of similar workers in other jobs.
ECLAC, 1999	8 L.A. countries[b]	Household survey data	Teachers' salaries have increased significantly during the 1990's (between 3% and 9% annually). However, the return per year of education is lower for teachers than for other professionals (with the exception of Costa Rica).[d]
Liang, 1999	12 L.A. countries[c]	Household survey data	Teachers are not underpaid, if one takes into account the number of hours they work and their individual characteristics, even though their annual incomes are lower than those of other professionals
López-Acevedo and Salinas, 2000	Mexico	Household survey data (National urban employment survey)	Teachers in primary education work fewer hours than their educational counterparts. Teachers' hourly salaries are substantially above other occupation's hourly salaries
Santibañez, 2002	Mexico	National urban employment survey	Teachers´ hourly salaries in the public sector are higher than other workers with similar human capital. However, total wages -unadjusted by worked hours- are lower.

Notes: [a] The countries are: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, Honduras, Panama, Peru, Uruguay and Venezuela. [b] Bolivia, Brazil, Costa Rica, Chile, Ecuador, Panama, Paraguay and Uruguay. [c] Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Honduras, Panama, Paraguay, Uruguay and Venezuela. [d] Work week is adjusted to 44 hours a week; however, the comparison does not control for all workers' characteristics.

Table A3
Factors Determining Labor Income in Chile, 1998
(dependent variable: log of hourly earnings from main job)

Variable	Coefficient	t-test
Constant	5.233	264.17**
Teacher	**0.028**	**1.84**
Years of schooling	0.095	89.10**
Potential experience	0.012	10.60**
Potential experience squared	-0.00002	-0.93
With professional degree	0.441	46.74**
Male* potential experience	0.006	4.57**
Male* potential experience squared	-0.0001	-4.76**
Single	-0.099	-14.22**
Male	0.100	6.59**
Urban	0.152	16.46**
Owner	1.177	86.30**
Self-employed	0.570	81.03**
Family member without payment	0.158	0.40
Domestic service living out	-0.143	-10.34**
Armed forces	0.167	6.58**
Region 1	-0.166	-9.82**
Region 2	0.015	0.91
Region 3	-0.164	-7.77**
Region 4	-0.207	-14.24**
Region 5	-0.190	-21.08**
Region 6	-0.179	-14.15**
Region 7	-0.231	-19.13**
Region 8	-0.259	-29.03**
Region 9	-0.275	-21.19**
Region 10	-0.318	-27.71**
Region 11	-0.032	-0.96
Region 12	0.083	3.23**
Adjusted R^2	0.48	
F	2,061.03**	
N	59,791	

Source: 1998 CASEN Survey
Notes: Excluded variables: 13th region (Metropolitan Santiago); employees.
** statistically significant at 1%, * statistically significant at 5%.

Table A4
Factors Determining Labor Income in Chile, 2000
(dependent variable: log of hourly earnings from main job)

Variable	Coefficient	t-test
Constant	5.460	236.79
Teacher	**0.044**	**2.95**
Years of schooling	0.091	78.97
Potential experience	0.010	9.16
Potential experience squared	0.000	-1.75
Male	0.074	4.57
Single	-0.109	-14.32
Urban	0.063	4.70
Male* potential experience	0.010	7.29
Male* potential experience squared	0.000	-6.60
With professional degree	0.450	47.38
Owner	1.083	75.15
Self-employed	0.405	53.13
Domestic service living out	-0.120	-8.79
Armed Forces	0.120	5.23
Region 1	-0.217	-12.54
Region 2	0.148	8.89
Region 3	-0.150	-6.66
Region 4	-0.201	-11.67
Region 5	-0.204	-20.93
Region 6	-0.195	-13.49
Region 7	-0.229	-16.31
Region 8	-0.266	-27.35
Region 9	-0.236	-16.11
Region 10	-0.235	-17.86
Region 11	-0.020	-0.52
Region 12	0.119	4.34
Adjusted R^2	0.435	
F	1,607.572	
N	54311	

Source: 2000 CASEN Survey
Notes: Excluded variables: 13th region (Metropolitan Santiago); employees.
** statistically significant at 1%, * statistically significant at 5%.

Table A5
Distribution of teachers by years of schooling

Years of schooling	Percentage of teachers
8	0.94
9	1.01
10	1.27
11	1.46
12	11.96
13	3.77
14	4.08
15	5.86
16	21.01
17	42.44
18	4.15
19	1.46
20	0.48
21	0.10
Total	100.00

Source: 1998 and 2000 CASEN survey

Table A6
Factors and Indicators of SNED

Factor (weight)	Indicator
Effectiveness (37%)	- SIMCE standardized score (language and mathematics for the last test round observed) 4th grade primary; 8th grade primary; 10th grade high school
Improvement (28%)	- SIMCE gain score (computed using the last two rounds of testing) 4th grade primary; 8th grade primary; 10th grade high school
Initiative (6%)	- School's educational activities and initiatives, measured by a school-level survey
Improvement of working conditions (2%)	- School's placement in Ministry of Education inspection system
Equality of opportunities (22%)	- Repetition and dropout rates - Absence of discriminatory practices, including expelling students who fail a grade or become pregnant, or rejecting students when there are openings. - Absence of improper punishment of students, including disciplinary measures for reasons other than behavior; retention of certificates of studies and/or leave; refusal of access to the school
Integration of teachers and parents (5%)	- School's participation and information activities, measured by a school-level survey - Parents' perceptions about the quality of the school, measured by a SIMCE survey of parents

Source: Ministry of Education

Table A7
School size and effectiveness

Muestra 1610 Establecimientos

Enrolment Decil	Effectiveness 1996			Effectiveness 1998			Effectiveness 2000			Effectiveness 2002		
	Mean	Standard deviation	Range	Mean	Standard deviation	Range	Mean	Standard deviation	Range	Mean	Standard deviation	Range
1*	56.65	8.79	44.09	230.95	19.82	96.96	232.63	16.37	104.25	232.73	17.87	107.00
2	60.02	6.29	32.43	236.39	17.58	98.84	235.89	12.97	83.00	233.61	15.57	101.50
3	59.90	6.46	41.15	238.00	16.00	87.98	235.33	14.03	84.00	235.19	15.96	93.75
4	63.15	6.48	37.07	246.88	16.54	107.89	243.27	15.93	90.75	242.49	17.32	99.25
5	61.31	7.78	40.64	244.11	17.92	93.71	241.79	17.83	100.88	242.97	19.18	95.00
6	62.10	6.61	37.75	244.12	16.31	86.69	242.43	16.44	82.78	241.47	17.57	93.25
7	63.17	7.16	41.25	247.93	17.64	95.51	246.03	18.34	92.95	245.29	19.06	106.50
8	62.71	7.69	40.91	250.13	17.82	91.25	247.16	18.26	94.45	247.01	19.76	95.50
9	64.17	7.88	43.60	253.51	18.43	89.47	250.91	19.12	84.67	251.00	20.24	96.17
10	61.73	7.78	40.34	251.77	17.89	87.01	250.26	19.05	85.53	249.44	19.85	98.00
Total	61.49	7.60	50.14	244.39	18.88	129.82	242.57	17.94	116.70	242.13	19.26	133.00

* Smallest enrolment.

Table A8
Descriptive statistics
Sample 1610 Schools

	SNED 2000				*SNED 1998*				*SNED 1996*				*Total*	
	without prize		*with prize*		*without prize*		*with prize*		*without prize*		*with prize*			
	Mean	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
Effectiveness 1998	238.82	17.87	254.00	16.57	240.88	17.41	251.03	19.77	242.58	18.20	248.84	19.80	244.39	18.88
Effectiveness 2000	239.69	16.69	247.56	18.91	240.07	16.37	247.32	19.74	240.77	16.83	247.01	19.73	242.57	17.94
Effectiveness 2002	238.92	17.88	247.67	20.29	239.37	17.95	247.34	20.55	240.18	18.28	246.93	20.72	242.13	19.26
Effectiveness 1996	60.14	7.41	63.83	7.36	59.38	7.01	65.51	7.05	60.27	7.61	64.50	6.69	61.49	7.60
Enrollment 1998	618.41	454.22	646.56	465.07	629.81	441.80	626.68	488.42	636.92	446.75	608.57	485.44	628.73	458.29
Socioeconomic index 1998	0.08	0.81	0.21	0.85	0.06	0.77	0.26	0.92	0.09	0.78	0.23	0.91	0.13	0.83
Full day school 4b 1998	0.13	0.33	0.13	0.34	0.12	0.33	0.14	0.35	0.11	0.32	0.16	0.37	0.13	0.33
Full day school 2m 1998	0.03	0.17	0.02	0.15	0.02	0.15	0.04	0.19	0.02	0.15	0.04	0.19	0.03	0.16
P-900 in 1998	0.16	0.37	0.13	0.34	0.18	0.38	0.10	0.31	0.17	0.38	0.11	0.31	0.15	0.36
Enrollment 2000	641.05	478.57	669.27	485.11	650.37	458.69	653.32	521.16	657.46	462.89	636.45	523.22	651.39	481.02
Socioeconomic index 2000	0.13	0.87	0.30	0.97	0.12	0.85	0.34	1.00	0.15	0.86	0.32	1.02	0.20	0.91
Full day school 4b 2000	0.03	0.18	0.04	0.19	0.03	0.18	0.04	0.20	0.03	0.17	0.04	0.20	0.03	0.18
Full day school 2m 2000	0.01	0.09	0.01	0.10	0.01	0.11	0.01	0.07	0.01	0.09	0.01	0.11	0.01	0.10
P-900 in 2000	0.16	0.37	0.07	0.26	0.17	0.37	0.06	0.23	0.14	0.35	0.09	0.29	0.13	0.33
Enrollment 2002	635.82	473.27	661.18	472.72	647.06	458.92	641.42	499.22	655.99	462.29	618.32	498.15	645.11	473.08
Socioeconomic index 2002	0.16	0.90	0.34	1.00	0.15	0.88	0.38	1.04	0.18	0.89	0.35	1.05	0.23	0.94
Full day school 4b 2002	0.04	0.20	0.04	0.19	0.04	0.20	0.04	0.19	0.05	0.21	0.03	0.17	0.04	0.20
Full day school 2m 2002	0.01	0.12	0.01	0.11	0.01	0.12	0.01	0.10	0.01	0.12	0.01	0.10	0.01	0.11
P-900 in 2002	0.32	0.47	0.23	0.42	0.32	0.47	0.23	0.42	0.29	0.45	0.29	0.46	0.29	0.45
Only boys schools	0.01	0.09	0.02	0.14	0.01	0.12	0.01	0.09	0.01	0.11	0.01	0.11	0.01	0.11
Only girls schools	0.03	0.17	0.06	0.24	0.04	0.18	0.05	0.22	0.04	0.19	0.05	0.21	0.04	0.20
Rural schools	0.26	0.44	0.27	0.45	0.26	0.44	0.27	0.45	0.25	0.44	0.30	0.46	0.27	0.44
Elementary schools	0.79	0.41	0.81	0.40	0.78	0.41	0.82	0.39	0.80	0.40	0.78	0.41	0.79	0.40
Secondary schools	0.05	0.22	0.04	0.20	0.05	0.22	0.04	0.20	0.06	0.23	0.03	0.17	0.05	0.21
Dummy Region I	0.01	0.08	0.01	0.09	0.01	0.08	0.01	0.10	0.00	0.06	0.02	0.13	0.01	0.09
Dummy Region II	0.02	0.14	0.01	0.12	0.01	0.12	0.02	0.15	0.02	0.13	0.02	0.14	0.02	0.13
Dummy Region III	0.02	0.13	0.02	0.13	0.02	0.13	0.02	0.13	0.02	0.12	0.02	0.15	0.02	0.13
Dummy Region IV	0.05	0.22	0.06	0.23	0.05	0.23	0.05	0.22	0.04	0.20	0.07	0.26	0.05	0.22
Dummy Region V	0.11	0.32	0.10	0.30	0.11	0.31	0.10	0.30	0.11	0.31	0.11	0.32	0.11	0.31
Dummy Region VI	0.07	0.25	0.06	0.24	0.06	0.25	0.06	0.25	0.07	0.26	0.05	0.22	0.06	0.25
Dummy Region VII	0.08	0.28	0.10	0.30	0.09	0.28	0.09	0.28	0.09	0.28	0.09	0.29	0.09	0.28
Dummy Region VIII	0.17	0.38	0.18	0.38	0.18	0.38	0.16	0.37	0.17	0.38	0.17	0.38	0.17	0.38
Dummy Region IX	0.10	0.31	0.09	0.29	0.09	0.29	0.12	0.32	0.10	0.31	0.09	0.28	0.10	0.30
Dummy Region X	0.10	0.31	0.11	0.32	0.11	0.31	0.10	0.30	0.11	0.32	0.09	0.29	0.11	0.31
Dummy Region XI	0.01	0.08	0.01	0.12	0.01	0.09	0.01	0.10	0.01	0.09	0.01	0.11	0.01	0.10
Dummy Region XII	0.01	0.09	0.01	0.11	0.01	0.10	0.01	0.10	0.01	0.10	0.01	0.10	0.01	0.10
Number of schools	1020		590		1054		556		1145		465		1610	

Table A9
Comparison number of SNED awards in the sample and for all schools

		Actual sample of principal surveyed						Total		
		answer the survey			did not answer the survey					
		Schools	% row	% col	Schools	% row	% col	Schools	% row	% col
Number of SNED awards	0	1,503	29.5	45.0	3,586	70.5	56.5	5,089	100	52.6
	1	956	36.9	28.6	1,636	63.1	25.8	2,592	100	26.8
	2	530	41.2	15.9	756	58.8	11.9	1,286	100	13.3
	3	255	46.8	7.6	290	53.2	4.6	545	100	5.6
	4	94	54.7	2.8	78	45.3	1.2	172	100	1.8
Total		3,338	34.5	100	6,346	65.5	100	9,684	100	100

Graph A1
Simulations for Teachers versus Non Teachers, 2000