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Measuring the relative pay of school teachers in Latin America 1997–2007

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ABSTRACT

How much are teachers paid in comparison to those in other professions in Latin America? How have these differences evolved in recent years? Is teachers' underpayment more pronounced in certain segments of the labor markets? This paper documents answers for those questions using data for thirteen Latin-American countries circa 1997 and circa 2007. After controlling the earnings differentials by observable characteristics we find that teachers are underpaid vis-à-vis other professionals and technicians in Latin America both, circa 1997 and circa 2007; and both, at their main and secondary jobs. We document a decrease in the earnings gap during the decade of analysis, mostly attributed to a general trend in gap reduction rather than as a result of teachers' improvements on their observable characteristics. The earnings gap shows important heterogeneities, across countries and along the earnings distributions. Additionally, using information from the main and secondary jobs we find that individual penalties for teachers go beyond their observable characteristics.

1. Introduction

Good Teachers are a crucial factor in the success of educational systems. To improve the quality of education it is essential to pay special attention to teachers, by implementing policies to attract, motivate and retain the most talented individuals in the profession. One of the most salient instruments for such policies is, obviously, salaries. As it has been documented, salaries affect teachers' motivation to educate (OECD, 2009; Figlio and Kenny, 2006; Ortega, 2010; Player, 2009; Heutel, 2009; Loeb and Page, 2000); cause good teachers to leave the profession (Imazeki, 2005; Harris and Adams, 2007; Scafidi et al., 2007); and prevent good students from choosing an education major in college (Corcoran, 2007).

In Latin America, teachers' salaries are often perceived to be lower than those of other professionals. The literature, however, has been inconclusive regarding their relative under or over-payment in the labor markets. The available empirical evidence shows that the sign and the magnitude of the conditional wage differential between teachers and other workers hinges on the definition of the comparison group, even when differences in observable characteristics are accounted for.

The aim of this paper is to revisit the question of conditional labor earnings differentials between teachers and other professionals and technicians in Latin America. The extent to which earnings differentials can be attributed to differences in observable socio-demographic and job characteristics is assessed with the non-parametric matching methodology developed in Ñopo (2008). This is an extension of the Blinder–Oaxaca (BO) decomposition (Blinder, 1973; Oaxaca, 1973) for which teachers and non-teachers are matched when showing exactly the same combination of observable characteristics. The method does not require any estimation of earnings equations and, by construction, allows a

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more precise salaries comparison for teachers and their counterparts than the previous literature has provided. Furthermore, this approach allows us to obtain not only more precise estimates of the average wage gap between teachers and non-teachers, but also a comprehensive exploration of its distribution.

We analyze the conditional earnings gaps in thirteen Latin American countries and their evolution between circa 1997 and circa 2007. We find that, although underpaid, teachers' earnings (vis-à-vis those of other professionals and technicians) improved during the decade, especially for the younger individuals, females, part-time workers and those holding only one job.

Moreover, since teachers more frequently report having more than one job compared to other professionals and technicians, we analyze earnings gaps at main and secondary jobs and document teachers' underpayment in both. We find the existence of unobservable individual job-independent traits that make teachers underpaid (within it one may consider cognitive ability, grit, etc.). This issue may in turn call attention to possible selection mechanisms into the teaching profession.

The rest of the paper proceeds as follows. In the next section we briefly discuss the literature, emphasizing the lack of consensus about teachers' relative earnings. In Section 3 we discuss the methodology, introduce the data sources, and explain the approach to harmonize them across countries and some descriptive statistics comparing teachers with other professionals and technicians. In Section 4 we present the main empirical analysis of earnings gaps decompositions, exploring not only the average earnings gaps, but also their distribution along the earnings ladder and analyzing the role of some characteristics of the teaching profession: shorter and more flexible job schedules (with the consequent possibility of holding an extra job and enjoying extra vacation periods), and more job stability (distinguishing it between the private and public sectors). In Section 5 we examine the evolution of the earnings gaps between 1997 and 2007. In Section 6 we conclude.

2. A review of the literature

A series of studies have analyzed teachers' salaries in Latin America examining whether they are under or over-paid[1]. Most of them use National Household Surveys to estimate Mincer wage equations with different control variables, and some use the Blinder–Oaxaca decompositions. The results are mixed. There is no robust empirical evidence showing that teachers receive lower or higher salaries than a comparable group of workers.

Psacharopoulos et al. (1996) use data for 12 Latin American countries to compare average wages without finding a clear pattern; in some countries teachers' pay is higher than the comparative group and vice versa. Liang (1999) finds that in 11 out of 12 countries analyzed, hourly wages for teachers are actually higher than their counterparts' in the labor force with similar observable characteristics. Hernani-Limarino (2005) examines the robustness of conditional wage differentials to the methods used and the definition of the comparable group for 17 Latin American countries. He concludes that in some countries (i.e. Chile) teachers earn more than the comparable workers. In some they receive lower salaries (i.e. Nicaragua), while in others the answer depends on the control group and the method used to estimate the wage gap. He also shows an increase in the unconditional earnings differentials in favor of teachers when these are compared with workers who have lower productive endowments. Estimating conditional wage differentials for different quantiles of the conditional wage distribution, he concludes that teachers are over or under-paid depending on their position in such conditional distribution.

This Latin American empirical evidence shows that the sign and magnitude of the conditional earnings differential between teachers and other workers crucially depend on the definition of the comparison group. In that regard, it is important to highlight that our comparison group differs from those reported in the previous literature. We compare teachers to other professionals and technicians, aiming at comparing workers with similar or comparable skills. Table 1 contrasts our results with those of the three pieces of the literature that analyze the Latin American region (Psacharopoulos et al., 1996; Liang, 1999; Hernani-Limarino, 2005), using their own definitions of teachers and comparison groups but computing all statistics (hourly earnings and wage gaps) with our data. As it can be noted, the previous literature included Legislators, Managers, Armed forces and, especially, Office workers as part of the comparison groups. The result of including all these workers in the comparison group has underestimated the magnitude of the earnings gaps. This is already an important departure point for this paper from the available literature.

In terms of country studies, Saavedra (2004) finds that for Peru earnings comparisons between teachers and other occupations depend on geographical differences. In Lima teachers earn less than comparable workers, while in the rest of the country they enjoy a wage premium. Mizala and Romaguera (2005) find that for Chile, once differences in observed characteristics are accounted for, teachers' salaries are similar to those they would receive in other occupations; however, they find relevant differences between men and women. Female teachers earn more than their counterparts, while male teachers earn less than similar workers in other sectors of the labor market. Vegas et al. (1998) find that 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. In Bolivia, Colombia, Guatemala and Mexico, the evidence points toward a teachers' wage premium, explained by the fact that they are public workers, i.e., teachers working in the public sector earn higher salaries than comparable private sector teachers and similar workers in other occupations (Piras and Savedoff, 1998; Gaviria and Umaña, 2002; Rivas and Lavarreda, 2008; López-Acevedo and Salinas, 2004). Furthermore, Herrero et al. (2003) for Argentina; and Urquiola et al. (2000) and Urquiola and Vegas (2005) for Bolivia, show that whether teachers are well paid depends on the comparison group, even when differences in observable characteristics are accounted for. Conditional wage differentials favor teachers when compared with all workers; nevertheless, the differentials disfavor teachers when compared with workers who had completed at least secondary education.

In sum, the available empirical evidence shows that the sign and the magnitude of the conditional wage differential between teachers and other workers crucially depends on the empirical strategy used (the comparison group and the econometric method). The methods applied have evolved over time; most of the earlier papers estimate earnings equations by OLS. More recently, new methods intending to correct for selection bias -due to the non-random allocation of individuals between professions/occupations- were implemented.

In addition, at least two issues should be taken into account when estimating wage gaps. First, it has been argued that onlyestimating the average wage gap is a drawback, given the heterogeneous behavior of wage differentials. In fact, there is some evidence of intra-country heterogeneity, for instance, regarding

[1] There are also several studies addressing this issue for non-Latin American countries, for instance, Taylor (2008), Podgursky and Tongrut (2006), Harris and Adams (2007), Stoddard (2005) for United States, Asadullah (2006) for Bangladesh; Komenan and Grootaert (1990) for Cote D' Ivoire; Zymelman and DeStephano (1989) for Sub-Saharan African countries.

Table 1
Literature review: earnings gaps for different comparison groups.

Reference	Teachers group		Comparison group		$C=(B-A)/A$ Earnings gap* (as percentage of teachers' average earnings) (%)
	Definition	Average hourly earnings (purchasing power parity, US$, 2000)*	Definition	B Average hourly earnings (purchasing power parity, US$, 2000)*	
Psacharopoulos et al. (1996)	School and university teachers. The definition included other school staff in cases when disaggregation was not possible	5.87	Public and private sector employees, excluding domestic servants and agricultural workers	3.17	−46.0
Liang (1999)	Preschool, special education, primary and secondary teachers; those employed in the formal sector—working more than 20 hours per week, not currently studying†	5.17**	Workers employed in the formal sector—working more than 20 hours per week, not currently studying	3.15**	−39.1**
Hernani-Limarino (2005)	Preschool, primary, and secondary teachers‡	5.29	Three alternative definitions: (i) All workers (ii) All workers that have at least completed secondary education (iii) All workers that are identified either as office workers or professionals/technicians	3.20 4.42 4.44	−39.6 −16.3 −16.0
Mizala and Ñopo (this document)	School teachers excluding those with particular specialties (e.g., teachers for students with special needs, language instructors, sports instructors, and dance or art instructors)	5.29	Those workers classified as "professionals" and "technicians and associate professionals" according to the occupational codes in country-year each survey	6.32	19.4

Source: Authors' calculations from household surveys.

† In Liang (1999), some university teachers are also selected by the author since his data does not permit a breakdown of different categories of teachers for El Salvador and Venezuela.

‡ In Hernani-Limarino (2005), for the cases of Argentina, Colombia, and Mexico, the author also included those working in special, technical, or higher education.

* Average hourly earnings for all comparisons are computed using the data set for this document, but the teachers and comparison group definitions of the different authors. In the case of Liang (1999), our data does permit a breakdown of different categories of teachers in El Salvador, so university teachers are not included. Earnings gaps are not being controlled by any observable characteristic.

** Ecuador and Bolivia are not included since our data does not report whether the individual is studying or not at the moment of the survey.

gender and geography (Mizala and Romaguera, 2005; Saavedra, 2004), as well as evidence of heterogeneity of the wage gap at different points of the conditional wage distribution (Hernani-Limarino, 2005).

Second, on the methodological side, earnings equations and the Blinder–Oaxaca decomposition have been criticized due to misspecification attributable to differences in the supports of the empirical distributions of individual characteristics for the two groups of workers being analyzed (Bellante and Ramoni, 2007; Ñopo, 2008). The problem is that these methods do not restrict the comparison to those individuals with comparable characteristics in both groups.

The existing literature on teachers' salaries does not address these issues in depth. We attempt to fill this gap, revisiting the question of conditional labor earnings differentials between teachers and other professionals and technicians in Latin America, but with a renewed methodological approach. Additionally, we explore some characteristics that may explain, to a certain extent, teachers' lower earnings in the form of compensating differentials, i.e., job tenure and job schedules. While the former is claimed to be longer among teachers, especially in the public sector; the latterare claimed to be more flexible among teachers (that is, more vacation weeks per year). Finally, besides controlling the earnings differentials by observable characteristics linked to productivity, we explore deeper into the role of individuals' unobservable characteristics by using information from their main and second jobs.

3. Data and methodology

3.1. The data

The data comes from nationally representative household and labor surveys of thirteen Latin-American countries circa 1997 and circa 2007. Table A1 in the on-line Appendix reports the specifics of each data source: the country, the survey name, the year and the number of observations for the whole sample of workers ("Full Set") and the subsamples of workers that will be compared in this paper ("Pre-School and Elementary Teachers", "High School Teachers" and "Other Professionals and Technicians"). The expansion factors of each data set are used such that the relative size of each sample proportionally corresponds to the working population of each country. Table A2 in the on-line Appendix shows the occupational categories per country that allowed us to identify teachers and other professionals and technicians. University teachers and those with particular specialties (e.g., teachers for students with special needs, language instructors, sports instructors, driving instructors, and dance or art instructors) are not considered for the analysis. They are neither part of the teachers' nor of the non-teachers' samples. Then, when we refer here to teachers or school teachers, we will be referring to both high school teachers and pre-school and elementary school teachers.

The sample of interest (school teachers and other professionals and technicians) represents 10.2% and 14.4% of the working sample

Table 2
Descriptive statistics and relative hourly earnings at the main job, by group (circa 2007).

	Descriptive statistics			Relative hourly earnings (base: average school teacher earnings in each country = 100)		
	Pre-school and elementary teachers (%)	High school teachers (%)	Other professionals and technicians (%)	Pre-school and elementary teachers	High school teachers	Other professionals and technicians
Average hourly earnings				93.8	119.1	118.2
Men						
No	86.9	61.4	42.8	92.4	118.7	108.6
Yes	13.1	38.6	57.2	102.9	119.8	125.4
Age groups						
24 and under	10.3	7.9	15.1	60.8	79.2	67.7
25 to 34	31.4	25.7	33.8	83.8	106.2	110.0
35 to 44	31.5	30.7	24.1	98.7	121.6	129.7
45 to 54	19.8	23.9	18.0	110.4	128.2	144.5
54 and over	7.0	11.8	9.0	118.1	149.0	150.7
Education level						
None or primary incomplete	0.2	0.0	4.5	49.5	32.8	60.9
Primary complete or secondary incomplete	3.0	1.1	8.3	67.5	92.9	71.3
Secondary complete or tertiary incomplete	77.9	65.5	68.6	91.9	117.0	115.9
Tertiary complete	18.9	33.5	18.7	106.0	124.0	161.5
Presence of children ($\leq$12 years) in the household						
No	51.6	59.1	53.3	96.4	121.3	121.1
Yes	48.4	40.9	46.7	91.0	116.0	114.0
Presence of elder ($\geq$65 years) in the household						
No	85.5	83.1	86.1	93.7	119.0	119.3
Yes	14.5	16.9	13.9	94.0	119.8	111.8
Head of the household						
No	69.8	56.9	53.3	89.1	113.5	102.9
Yes	30.2	43.1	46.7	104.5	126.6	135.7
Presence of other household member with labor income						
No	85.5	83.1	86.1	94.3	120.1	123.6
Yes	14.5	16.9	13.9	93.6	118.8	116.1
Labor characteristics						
Part time						
No	44.4	51.3	80.6	84.9	106.1	114.2
Yes	55.6	48.7	19.4	100.9	132.8	135.2
More than one job						
No	81.2	72.1	89.3	91.4	116.2	115.3
Yes	18.8	27.9	10.7	104.0	126.8	143.1

Source: Authors' calculations from household surveys.

circa 1997 and circa 2007, respectively. Those who declare being teachers stand for 3.5% and 3.1%, and the other professionals and technicians stand for 6.6% and 11.3% of the working sample for each period, respectively. Outliers for income at the main occupation were dropped from the data set. This comprised 1% of the working sample for both periods under analysis (0.3% and 0.6% of the school teachers, and 6% and 5% of the other professionals and technicians for each period, respectively).

The first part of the analysis will focus on the most recent years for which there is available data. Table 2 shows the descriptive statistics and relative hourly earnings for observable characteristics in all countries' data sets circa 2007. Teaching is an occupation dominated by females as approximately nine out of ten pre-school and elementary teachers are women, and six out of ten high school teachers are so. On the other hand, the proportion of males among other professionals and technicians is roughly more than 50%. Teachers' educational achievement surpasses that of other professionals and technicians. Around 50% of pre-school and elementary teachers report living with children (12 years old or younger), while around 45% of high school teachers and non-teachers do so. Also teachers, particularly high school teachers, report living with elder people (65 years or older) in a higher proportion than the other groups. Household headship is less prevalent among teachers than among other professionals and technicians. The proportion of teachers working part-time (30 hours or less per week) is almost threefold than that of other professionals and technicians. Even more interesting, a higher proportion of teachers have a secondary job.

Earnings are computed per-hour, by dividing the monthly income by 4.3 times the number of hours worked in a week, and are measured in terms of purchasing power parity (PPP, US$, 2000)[2]. Average school teachers' hourly earnings have been set equal to 100 for each country (i.e., the average hourly earnings of both pre-school and elementary teachers and high school teachers altogether).

The typical patterns arise regarding earnings differences according to the observable characteristics of the populations. Men earn more than women, especially in the case of other professionals and technicians. Earnings increase along a worker's life span, as well as with higher educational attainment. People that live with children, live with elder people, are not household

[2] The monthly income corresponds to the monthly earnings received from the main occupation in the month previous to the survey. The job schedule is captured with survey questions of the type, for example: "¿Quantas horas trabalhava normalmente por semana nesse trabalho? ¿Cuántas horas trabaja efectivamente en su empleo o actividad principal? Señale horas semanales, ¿cuántas horas efectivas al día trabajó la semana pasada? ¿Cuántas horas trabajó la semana pasada en la ocupación principal? El mes pasado, ¿cuántas horas a la semana trabajó en este negocio o empresa? ¿Cuántas horas por semana trabaja regularmente como…? ¿Cuántas horas, días y en qué jornada trabajo efectivamente la semana anterior?". So, it can be inferred that teachers are referring not only to their effective class time but to their whole job schedule (including preparation, grading, meeting times and the like).

heads and live with another wage earner tend to earn less that those who do not or are not. These differences tend to be more pronounced among other professional and technicians than among teachers. Additionally, hourly earnings of part-time workers are higher than those of full-timers; and those who report having more than one job earn more than those who do not. Many of these patterns are in line with the high feminization of the teaching profession within a context in which salaries in Latin America are fixed in per-month terms (as opposed to per-hour, as in other economies), as documented in Ñopo (2012). Moreover, the part-time hourly earnings premium detected in the descriptive statistics disappears once observed individual characteristics are taken into account; Betancor and Romano (2014) report similar results for the Chilean labor market.

At the aggregate level, on average, other professionals and technicians earn around 23.3% more than pre-school and elementary teachers and 4.5% less than high school teachers (although this last difference is not statistically significant at conventional levels). These statistics, however, are merely referential. They compare teachers with professionals and technicians that might differ substantially in terms of observable characteristics. Teachers and other professionals and technicians differ regarding their human capital, job characteristics and socio-demographic composition. So, it is appropriate to think that these differences in observable characteristics play a role in explaining the earnings differentials. Hence, controlling the earnings gap by observable characteristics becomes necessary for a better estimation of the underlying earnings gap.

3.2. The matching approach to assess earnings differentials

A traditional way to asses earning gaps and the role of observable characteristics has been using different variations of the Blinder–Oaxaca decompositions. In this paper we use a non-parametric extension of it that allows not only a more precise and detailed assessment of the earnings gaps (and its distribution), but also more econometric flexibility on the estimations of the role of observables. It is also intuitively easier to understand as it only requires the use of matching.

According to this matching approach we will compare teachers' and other professionals' earnings who share the same observable characteristics[3]: gender, age, education, presence of children (12 or younger) in the household, presence of elders (65 or older) in the household, whether the worker is head of household, presence of other wage earners in the household, whether the individual works part-time, and whether the individual holds a second job. As an example, the earnings of a male teacher, 38 years old, with college diploma, no children in his household, no elders in his household, who is a full-time worker and does not have a second job; will be compared to the earnings of a male professional with exactly the same characteristics (38 years old, with college diploma, no children in his household, no elders in his household, who is a full-time worker and does not have a second job).

In the nationally representative data sets described above we search for all possible matches of teachers and other professionals with the same observable characteristics and perform the earnings comparisons. It is worthwhile to highlight two characteristics of this approach. First, it is not necessary to estimate any earnings equations, making the results intuitively easier to understand. Second, in the common support of observable characteristics (that is, those characteristics for which it is possible to find both teachers and other professionals) this method is equivalent to the original Blinder–Oaxaca decomposition[4]. The traditional "differences in returns vs. differences in characteristics" can be computed with this matching approach but we will focus on reporting the differences that cannot be explained by differences in characteristics (the one labeled as "differences in returns" by the earlier literature on the topic). Moreover, matching also has the advantage of allowing deeper explorations of the distribution of such unexplained component of the gap.

The next section presents computations of the earnings gaps between teachers (preschool and primary, and secondary) and other professionals and technicians after matching individuals according to their observable characteristics.

4. Teachers' earnings vis-à-vis those of other professionals and technicians

4.1. The earnings gap circa 2007 and its distribution

The extent to which earnings differentials can be attributed to differences in observable characteristics is explored next. This is done using matching comparisons such that each teacher is paired with a professional or technician with the same observable characteristics.

As previously mentioned, the characteristics are gender, age, education, presence of children (12 or younger) in the household, presence of elders (65 or older) in the household, whether the worker is or is not the head of household, presence of other wage earners in the household, whether the individual has a part-time job, and whether the individual holds a second job. All together these will be referred to as the "full set" of observable characteristics. These variables are sequentially added as matching variables in the same order as mentioned here.

The decompositions are calculated for (i) pre-school and elementary school teachers and (ii) high school teachers, vis-à-vis other professionals and technicians. The results for the region as a whole are reported in Fig. 1. The extremes of the boxes correspond to the limits of a 90% confidence interval for the unexplained average gaps. The extremes of the whiskers correspond to those of a 95% confidence interval. The dots in the middle of the boxes correspond to the averages. In the figure, one variable is sequentially added to the set of matching variables as one moves from left to right. In this way, the first pair of bars corresponds to the original earnings gaps (the one that does not control for any observable characteristics), the second pair of bars corresponds to the earnings gaps after controlling for gender and the last pair of bars corresponds to the unexplained earnings gaps that remain after matching on all the characteristics of the demographic set of variables.

For high school teachers, the inclusion of education as a matching variable moves up the unexplained gap. High school teachers have more years of schooling than their counterparts working as other type of professionals and technicians, but they are not compensated for this in terms of wages. After the inclusion of all demographic variables, high school teachers' underpayment with respect to other professionals and technicians is between 10% and 30%.

For pre-school and elementary school teachers the gap moves up after the inclusion of part-time job and it does not change after including the indicator for more than one job. The restriction of the labor supply at the intensive margin for teachers is linked to a more severe underpayment for teachers. At this point it is important to

[3] Earnings gap computed as the difference in average earnings between non-teachers and teachers, expressed as a percentage of teachers average earnings.

[4] For details about the econometric properties of this method see Ñopo (2008). Table A3 in the on-line Appendix shows a comparison of the matching approach with the original decompositions based on regressions.

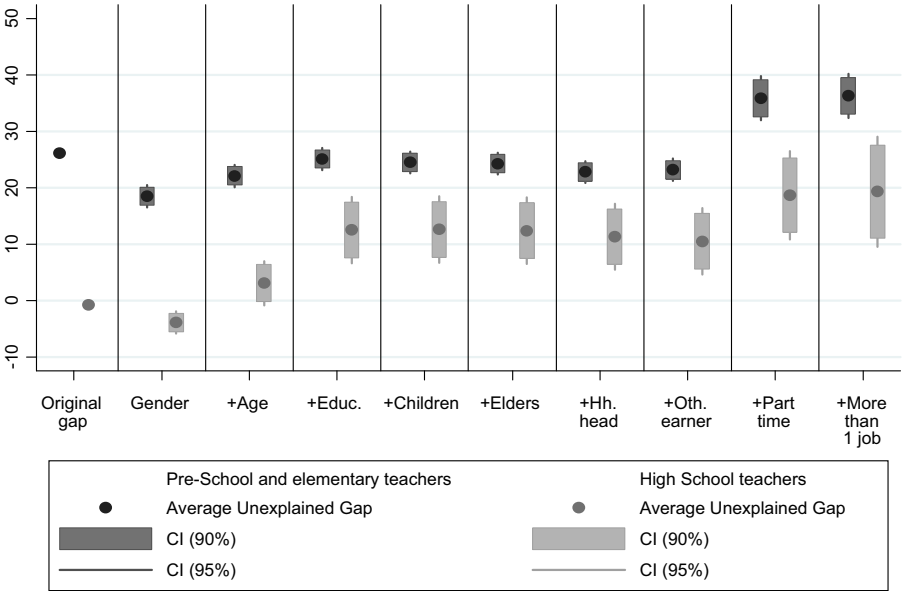

Fig. 1. Confidence intervals for the unexplained earnings gap controlling by observable characteristics: pre-school/elementary school and high school teachers versus other professionals and technicians (circa 2007). *Source:* Authors' calculations based on household surveys. *Note:* Boxes show 90% confidence intervals for unexplained earnings; whiskers show 95% confidence intervals.

recall that more than half of the teaching population in this group works part-time. All in all, the underpayment of pre-school and elementary teachers with respect to other professionals and technicians, after matching on all demographic characteristics, is between 30% and 40%, higher than the one facing high-school teachers.

Fig. 2 delves deeper into the earnings gaps showing important cross country heterogeneity. After controlling for the full set of demographic characteristics, Nicaragua and Peru are the countries that show the biggest underpay for pre-school and elementary as well as high-school teachers, with respect to their peers who work as professionals and technicians. The countries that present the lowest underpay (or even overpay) with respect to their peers who work as professionals and technicians are Paraguay and El Salvador for pre-school and elementary school teachers and Dominican Republic and El Salvador for high-school teachers.

As previously indicated, one important advantage of using matching instead of the traditional regression-based Blinder–Oaxaca decompositions is the possibility for exploring beyond average earnings gaps. With the matching approach it is simple and straightforward to explore the distribution of the unexplained earnings gaps just reported above. Fig. 3 shows earnings gaps at

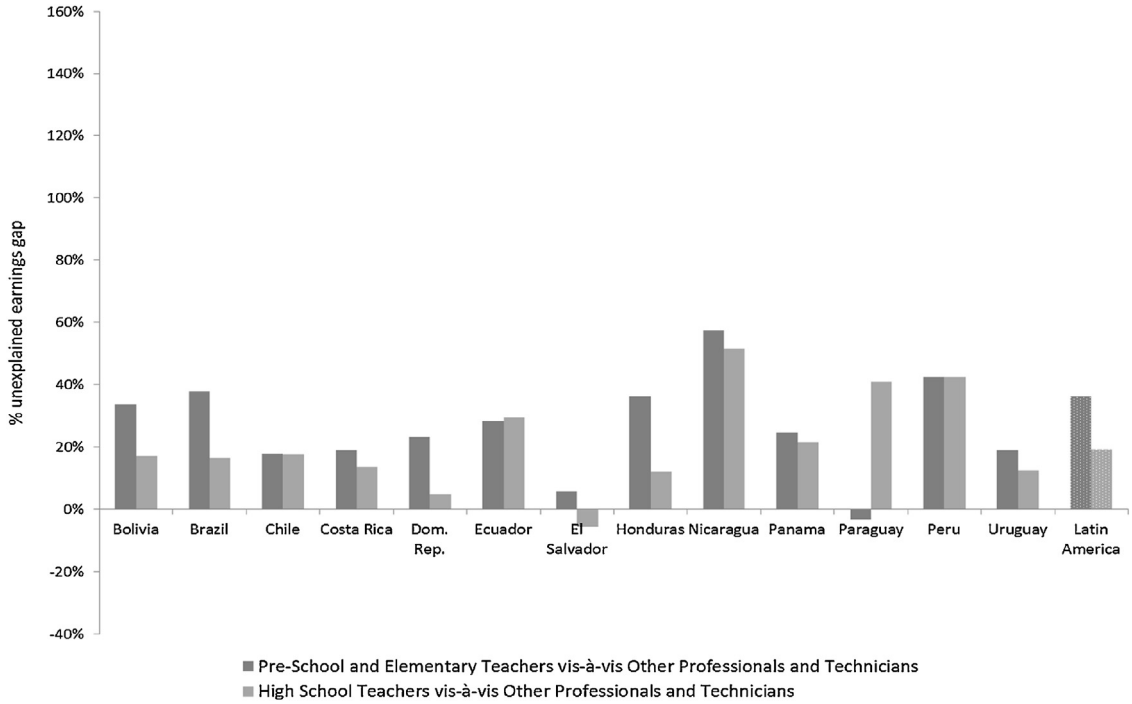

Fig. 2. Average unexplained earnings gaps controlling by full set of observable characteristics, by country (circa 2007). *Source:* Authors' calculations based on household surveys.

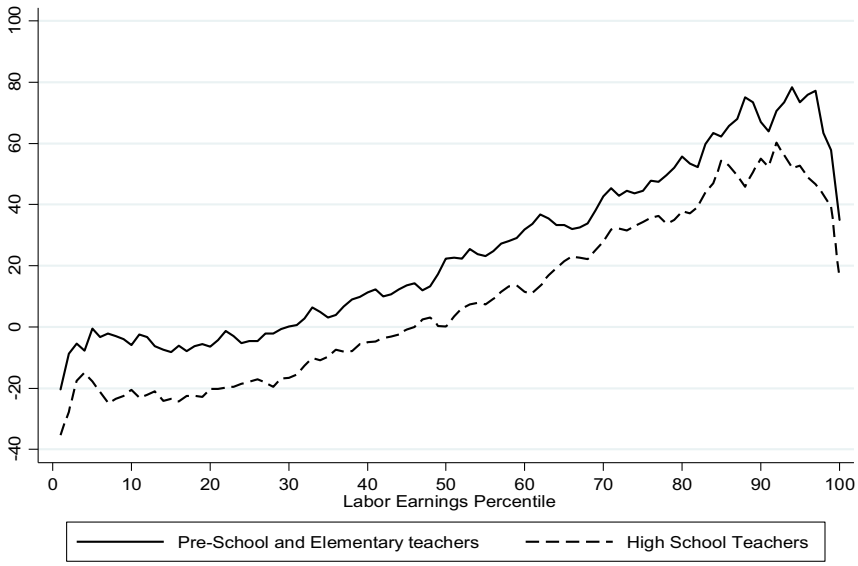

Fig. 3. Unexplained earnings gaps along percentiles of the earnings distribution (after controlling by the full set of observables characteristics): pre-school/elementary school and high school teachers versus other professionals and technicians (circa 2007). *Source:* Authors' calculations based on household surveys.

different percentiles of the earnings distributions of the populations under comparison. That is, after matching, the *p*th percentile of the distribution of teachers' salaries is compared to the *p*th percentile of the distribution of professionals' salaries. The plot reveals that the problem of teacher underpayment is focused at the high end of the distribution. The earnings gap in the bottom percentiles of the distribution do not considerably contribute to the aggregate measure of unexplained earnings differences between teachers and other professionals and technicians; the average earnings gap in Latin America is driven by pay differences at the top percentiles of the earnings distribution. Pre-school and elementary school teachers earn less than their peers in other professions for the 30th percentile and above, while half of the teaching body in high-schools (the 50th percentile and above) faces a negative earnings gaps with respect to their professional peers. This can be explained by the fact that in many countries teachers are rewarded through a single salary schedule which implies a salary structure much more compressed than the one of other professionals and technicians.

Figs. A1 and A2 in the on-line Appendix show confidence intervals for the earnings gaps in different segments of the labor markets. The earnings gaps are higher for middle age workers (and this is specially faced by pre-school and elementary school teachers), for the highly educated, for those with children in their households and those holding more than one job.

4.2. Exploring the role of certain characteristics: Schedules, vacations, secondary jobs, public sector employment and tenure

Most policy discussions regarding the choice of a teaching career highlight some characteristics intrinsic to a teaching job. Two of the most salient characteristics are the shorter (and flexible) job schedules and the stability that the profession enjoys. As it is common in economics, these features come at a price. In this case, the price would be expressed in terms of earnings disparities between teachers and their peers.

4.2.1. Second jobs

As highlighted in Table 2, teachers' propensity to have a second job is higher than that of other professionals and technicians, especially for those teaching at the high-school level (for this later group almost one-quarter of teachers has a second job). This fact allows us to delve deeper into the role of individuals' unobservable characteristics by using information from their main and second jobs.

Many countries within our data report the existence of second jobs but it is only possible to obtain data for earnings, hours worked per week and type of activity in the second job in nine countries: Bolivia, Brazil, Costa Rica, Ecuador, Honduras, Nicaragua, Panama, Paraguay and Uruguay. The next part of the analysis will focus on these countries. Within these countries we restrict attention to those individuals who: (i) hold a second job, (ii) have information on earnings, hours worked per week and type of activity in the second job; and (iii) the second job activity is within the professionals and technicians group (i.e. we discard those individuals whose second job is under the occupational categories of Legislators, Managers, Armed forces and, especially, Office workers, to be consistent with our previous estimates and our critique of the previous literature). Combining these three restrictions, the resulting sample represents around 8.17% of the original teachers sample and 4.36% of the original non-teachers sample circa 2007.

Table 3 shows selected descriptive statistics for the sub-sample. The upper panel of the table (main job) depicts that part-time workers at their main job earn more than those who work full-time, and a greater share of teachers report working part time. The intermediate panel of the table shows data from the second job. Two results emerge. First, to an important extent the second job of teachers tends to be at another teaching position. Second, hourly earnings at second jobs are higher than those at the first jobs. The bottom panel of Table 3 shows descriptive statistics for main and secondary jobs combined (i.e., earnings are equal to the sum of main job and second job monthly earnings). The evidence still points toward more working hours, and higher earnings, for non-teachers than for teachers.

Table 4 shows the original and the unexplained earnings gap for main and secondary job (using hourly earnings), and the combination of both (using monthly earnings). Since we are restricting the sample to those workers that report having a second job, the "Full Set" specification does not include the "more than one job" variable. Additionally, we add another control variable, whether the worker's second job is related to school teaching or not, after controlling by the full set of observable characteristics. The unexplained hourly earnings

Table 3
Descriptive statistics (9 countries with data on second job, circa 2007).

Sub-sample of workers that reported having a secondary job related either to school teaching or to other professional and technical occupations, the related activity, earnings and hours worked per week in this second job			
	Pre-school and elementary teachers	High school teachers	Other professionals and technicians
Main job			
Part-time work			
Region average	78.5%	67.0%	46.3%
Average hourly earnings (part-time workers)*			
Region average	92.4	124.8	149.1
Average hourly earnings (non part-time workers)*			
Region average	81.6	107.2	135.4
Second job			
Second job involves school-teaching activities			
Region average	90.7%	80.1%	5.9%
Average hourly earnings in second job*			
Region average	120.6	150.2	328.2
Main and second jobs (combined)			
Average hours worked per week in main and second jobs			
Region average	34.1	38.2	41.0
Works over-time (50 hours a week or more)			
Region average	40.6%	48.0%	63.1%
Average monthly earnings in main and second jobs**			
Region average	92.0	116.6	196.9
Observations	661	469	2009
Expanded observations	249,130	132,756	607,364

Source: Authors' calculations based on household surveys.
* Average school teacher earnings in main job in each country = 100.
** Average school teacher monthly earnings in main and second jobs (combined) in each country = 100.

Table 4
Unexplained earnings gap controlling by the full set of observable characteristics and teaching in the second job (9 countries with data on second job, Circa 2007).

	Hourly earnings					Full monthly earnings		
	Original gap	Controlled by the full set of observable characteristics	Original gap	Controlled by the full set of observable characteristics	+ Second job: school teacher	Original gap	Controlled by the full set of observable characteristics	+ Second job: school teacher
Pre-school and elementary teachers vis-à-vis other professionals and technicians								
Region average	124.3%	94.7% (9.07)	161.6%	94.3% (9.72)	57.4% (39.63)	145.6%	86.5% (6.75)	42.1% (22.33)
High school teachers vis-à-visother professionals and technicians								
Region average	93.8%	79.2% (13.75)	92.2%	54.9% (20.85)	29.6% (50.64)	103.9%	70.7% (13.17)	92.0% (38.71)

Source: Authors' calculations based on household surveys. *Note:* Standard errors in parentheses. The full set specification does not include the variable "more than one job" as we are restricting our comparison to those who report having a second job.

gaps at the second job are also positive but smaller than those at the main job for both periods.

In all their second jobs, whether involved with teaching duties or not, teachers face earnings gaps vis-à-vis other professionals and technicians. This may reflect the existence of some individuals' unobservable characteristics (or abilities) that the labor markets reward for which teachers fare worse than other professionals and technicians. To further explore such a possibility we estimate:

$$y_{ij} = \alpha + t_{ij}\beta + \mu_i + \epsilon_{ij},$$

where y_{ij} represents the logs of earnings of individual i in job j; t_{ij} is a dummy variable that takes the value 0 if the individual i is a teacher in her/his job j and 1 if she/he works as other professional or technician at such job; μ_i is the unobserved (job-independent) individual heterogeneity, and ε_{ij} is an idiosyncratic error term.

The novelty of this approach is that we are able to separately identify two types of unobserved elements: μ_i corresponds to the individual heterogeneity that would allow an individual to earn higher wages regardless of the characteristics of their jobs (within it one may consider cognitive ability, grit, etc.); and ε_{ij} corresponds to the individual heterogeneity that depends on the relationship between the individual and her/his job (within it one may consider motivation, teamwork, peer effects, etc.). In the analysis that follows we will focus on μ_i, the labor markets rewards of individual unobserved characteristics that are independent of the job.

Due to the small sample size for this exercise, in this estimation we pooled the data from circa 1997 and circa 2007. We use matching weights such that differences in observable characteristics between teachers and other professionals and technicians, at least those using in the matching[5], are eliminated. Table 5 reports the two coefficients of the regression and their standard errors. Non-teaching jobs pay around 9% more than teaching

[5] Gender, age, education, presence of children at home, presence of elders at home, an indicator for being a household head, an indicator for the presence of other income earner at home, part-time work and whether or not second job involves school teaching activities.

Table 5
Fixed-effects estimation of the role of teaching on hourly earnings (6 countries with data on second job in circa 1997 and circa 2007).

	Dependent variable: logs of hourly earnings
Job does not involve teaching related activities	0.0897***
	(0.0025)
Intercept	0.1580***
	(0.0021)
Correlation between μ_i and t_{ij}	0.34
Observations	329
Expanded observations (weighted by matching distribution)	319,254

Source: Authors' calculations based on household surveys. *Note:* Standard errors in parentheses.
*** Statistically significant at 1% level.

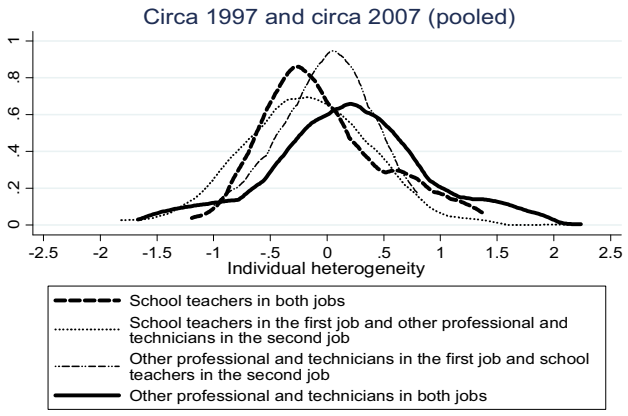

Fig. 4. Estimated kernel distributions of individual heterogeneity of school teachers and other professional and technicians (6 countries with data on second job). *Source:* Authors' calculations based on household surveys. Bandwidth: 0.2.

ones, difference that is statistically significant at 1% level. Fig. 4 shows the empirical distributions of the unobserved individual heterogeneity for different groups of individuals according to the type of job they hold at their main and secondary jobs. The unobserved heterogeneity among teachers is to the left of that for other professional and technicians, providing additional support to the idea that there are some individuals' unobservable characteristics rewarded in the labor markets for which teachers fare worse than their peers.

4.2.2. Job-breaks, tenure and public sector employment

In order to take into account that job-breaks are not the same across occupations we will now introduce an adjusted measure of hourly earnings. Unfortunately, detailed information on vacations and schedules is not available in most household surveys, so we built a proxy. Adjusted hourly earnings are computed as follows: for teachers, we assume two months of paid vacations per year so their hourly earnings are multiplied by a 12/10 ratio; for other professionals and technicians dependent workers we assume one month of paid vacations so that hourly earnings are multiplied by a 12/11 ratio; and for independent workers we assume no paid vacations so that their monthly earnings are multiplied by 12/12 = 1. Paid vacations might vary across (and within) countries and over the life cycle, so this proxy is just a coarse approximation and should be taken only as a ballpark figure of the role of these characteristics on the earnings gaps.

The next results, in Table 6, present gaps decompositions for earnings measured both in hourly terms (as it has been reportedbefore) and in adjusted hourly terms (with the proxy measure described in the previous paragraph). As expected, the earnings gaps computed with adjusted hourly earnings (four columns on the right) are smaller than those originally reported (non-adjusted, four columns on the left). Interestingly the adjusted measures of gaps are still positive and significant at any reasonable significance level.

Table 6 is divided into two panels; the upper panel (A) shows decompositions that allow us to explore the role of tenure. It has

Table 6
Unexplained earnings gaps after controlling by the full set of observable characteristics, job tenure and sector (public vs. private) (circa 2007).

	Hourly earnings				Adjusted hourly earnings			
	Original gap	Controlled by the full set of observable characteristics	+ Tenure	+ Job in public sector	Original gap	Controlled by the full set of observable characteristics	+ Tenure	+ Job in public sector
Panel A								
Pre-school and elementary teachers vis-à-vis other professionals and technicians								
Region average*	27.1%	36.7%	32.4%		13.7%	22.2%	20.0%	
		(1.85)	(2.87)			(1.68)	(2.61)	
	27.3%	50.3%	46.4%	51.1%	13.9%	34.2%	33.7%	36.7%
		(1.83)	(3.67)	(1.84)		(1.66)	(3.37)	(1.7)
High school teachers vis-à-vis other professionals and technicians								
Region average*	−0.5%	19.3%	13.0%		−11.0%	7.1%	2.2%	
		(4.91)	(6.58)			(4.4)	(5.94)	
	−0.4%	35.0%	21.7%	38.8%	−10.9%	21.1%	11.1%	25.8%
		(3.81)	(6.94)	(4.03)		(3.44)	(6.4)	(3.7)
Panel B								
Pre-school and elementary teachers vis-à-vis other professionals and technicians								
Region average**	26.2%	49.7%		50.7%	12.9%	33.7%		36.4%
		(1.78)		(1.8)		(1.62)		(1.67)
High school teachers vis-à-vis other professionals and technicians								
Region average**	−0.7%	34.9%		38.6%	−11.1%	20.9%		25.6%
		(3.72)		(3.95)		(3.35)		−362.0%

Source: Authors' calculations based on household surveys. *Note:* Standard errors in parentheses.
* 11 countries with data on job tenure: Bolivia, Brazil, Chile, Dominican Rep., Ecuador, Honduras, Nicaragua, Panama, Paraguay, Peru, Uruguay.
** 13 countries with data on job sector: Bolivia, Brazil, Chile, Costa Rica, Dominican Rep., Ecuador, Honduras, Nicaragua, Panama, Peru, Paraguay, El Salvador and Uruguay.

Table 7
Evolution of average unexplained earnings gaps controlling by the full set of observable characteristics.

	Hourly earnings				Adjusted hourly earnings			
	Original gap		Controlled by the full set of observable characteristics		Original gap		Controlled by the full set of observable characteristics	
	Circa 97	Circa 07	Circa 97	Circa 07	Circa 97	Circa 07	Circa 97	Circa 07
Pre-school and elementary teachers vis-à-vis other professionals and technicians								
Region average	80.5%	26.1%	89.4% (2.13)	36.3% (1.8)	61.4%	10.3%	64.4% (2.35)	32.8% (1.73)
High school teachers vis-à-vis other professionals and technicians								
Region average	21.4%	−0.8%	31.7% (5.16)	19.3% (4.78)	8.5%	−14.6%	29.0% (5.26)	21.4% (3.86)

Source: Authors' calculations based on household surveys. *Note:* Standard errors in parentheses.

typically been claimed that the teaching profession entails more job stability than others. This may in turn convert into a compensating differential that teachers are willing to accept in the form of lower salaries. Therefore, we assess the role of job tenure on the earnings gaps. Job tenure is defined here as the approximate number of years an individual has remained in the same job at the moment of the survey. As in the previous case with second jobs, this analysis cannot be performed for the thirteen countries of the original analysis. We restrict our attention to eleven of them (Costa Rica and El Salvador do not have the necessary data). This implies restricting to 91.5% of the original data for teachers and 89% of the non-teachers' circa 2007. No descriptive statistic within this restricted data set is significantly different than those reported in Table 2 for the total of thirteen countries. The earnings gap for preschool and elementary teachers in both periods and for all specifications drops when adding job tenure as a control variable. These results give support to the idea that job stability acts as a compensating differential.

In this regard it is important to bring up another discussion, the earnings differences between the public and private sectors. The public sector is an important employer for teachers and moreover, worker's characteristics are different across both sectors. Among other professional and technicians there is a higher prevalence of males in the private sector. Also, workers in the public sector tend to be older than those in the private sector. Among teachers, age is also a distinctive characteristic; being older those working in the public sector. Additionally, a higher proportion of teachers in the public sector tend to be heads of household and to have children at home than those in the private sector. As expected, a higher share of teachers works in the public sector. Public teachers enjoy a positive tenure gap vis-à-vis other professionals and technicians working in the public sector. In contrast, teachers in the private sector have slightly less job stability than other professionals and technicians[6].

Also in Panel A of Table 6, we report earnings gaps decompositions adding both job sector and job tenure as control variables. Job sector (private vs. public) increases the earnings gap for both groups, pre-school and elementary teachers and high school teachers, and for all specifications. Table A4 (in the on-line Appendix) shows the results by country. These results, however, must be interpreted with caution due to the small size of the common support.

The lower part of Table 6, panel B, shows the role of job sector without tenure as a confounding factor. Adding this variable as a control slightly increases the earnings gap for preschool and elementary teachers; and it does more so for high school teachers. Interestingly, the earnings gaps are higher in the public sector than in the private one for both pre-school and elementary teachers and high school teachers.

5. Earnings changes between 1997 and 2007 for teachers vis-à-vis other professionals and technicians

This section of the paper examines the evolution, between circa 1997 and circa 2007, of teachers' salaries vis-à-vis other professional and technical occupations. We analyze whether, after controlling the earnings differentials by observable characteristics linked to productivity (age, education, etc.), teacher earnings improved or deteriorated during the decade. We also study what is behind the change in earnings gap.

5.1. Evolution of average earnings Gaps, controlling for observable characteristics

Table 7 shows the drop in earnings gaps between the teaching groups and the comparable group of other professionals and technicians for the period under analysis. The gap dropped for both the gap measured in hourly and adjusted hourly earnings. Fig. 5 shows earnings gaps by country circa 1997. Comparing it with Fig. 2, which shows earning gaps circa 2007, it can be seen that the drops in earnings gaps have been heterogeneous within the region. Earnings gap between pre-school and elementary teachers vis-à-vis other professionals and technicians decreased in most countries of the region but it did so especially in Bolivia, Brazil and the Dominican Republic. The only countries where such a gap increased were Costa Rica and Ecuador. The gap regarding high school teachers markedly decreased in Bolivia, Brazil and Uruguay; the gap increased for Paraguay, Nicaragua and El Salvador.

What is behind the decrease in earnings gap? Did the observable characteristics of teachers relatively improve (that is, was it a change in X's)? Or is it that the rewards of those characteristics changed over time (that is, was it a change in β's)? To further explore these two effects we perform a "matching after matching" exercise (Ñopo and Hoyos, 2010). This result involves two stages of matching. The first one, performed with the full set of observable characteristics, is the matching we already implemented and reported in previous tables and figures. That is, teachers are matched with other professionals and technicians in each moment under consideration (circa 1997 and circa 2007). In this way we have counterfactual distributions of the comparing groups that at each point in time do not differ in observable characteristics. The second stage is then performed with these two matched samples, resampling the individuals with observations in 2007 such that their observable characteristics are distributed as in 1997. In this way not only teachers and non-teachers show no differences in observable characteristics, but also they show no changes in the

[6] These results are not reported but available upon request.

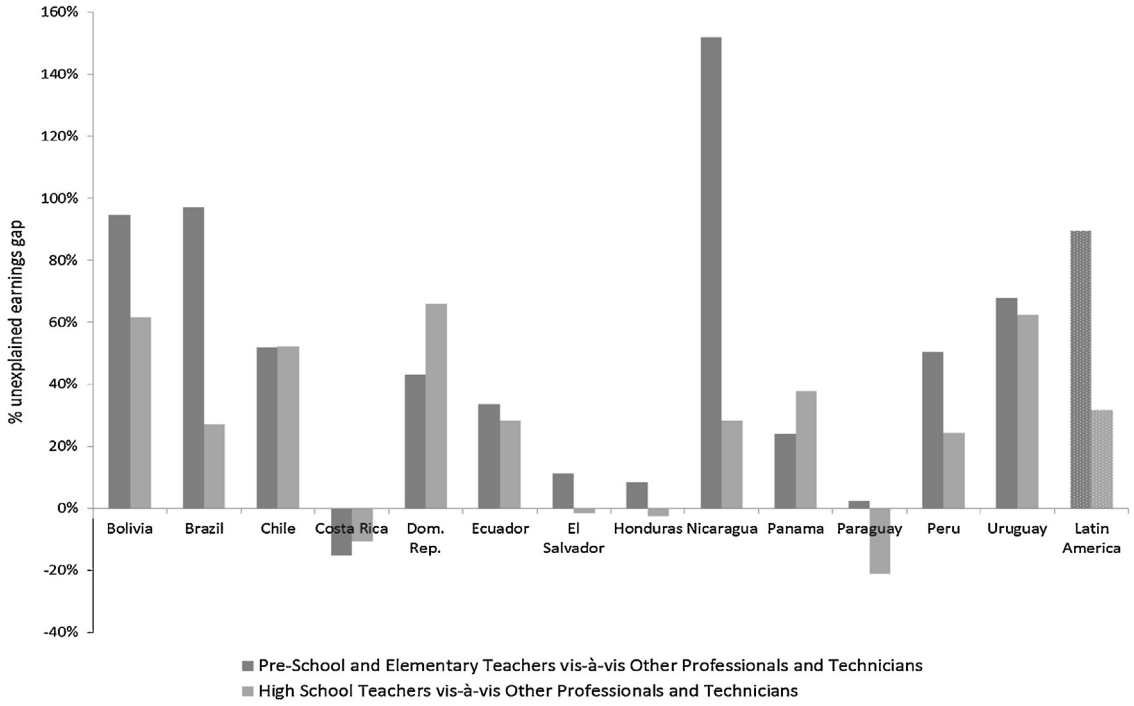

Fig. 5. Average unexplained earnings gaps controlling by full set of observable characteristics, by country (circa 1997). *Source:* Authors' calculations based on household surveys.

Table 8
Decomposition of the change in unexplained earnings gap circa 2007–circa 1997 (after controlling by the full set of observable characteristics).

	Counterfactual change if no change in *X*'s	Part of the change due to change in *X*'s	Total change
Pre-school and elementary teachers vis-à-vis other professionals and technicians	−65.3% (4)	11.2% (0)	−54.1% (0)
High school teachers vis-à-vis other professionals and technicians	−22.0% (7)	9.0% (0)	−13.0% (0)

Source: Authors' calculations based on household surveys. *Note:* Standard errors in parentheses.

distribution of those characteristics during the period under analysis. They will be distributed as in 1997.

The results, shown in Table 8, indicate that most of the drops in earnings gaps are attributable to changes in the rewards to the characteristics rather than changes in the characteristics themselves. Actually, the parts of the evolution in earnings gaps attributable to changes in the characteristics are positive. With no changes in the rewards to the teaching profession, their underpayment vis-à-vis other professionals and technicians would have increased during the period of analysis.

5.2. Changes in the distribution of the unexplained earnings gap

Moreover, within this matching exercise it is possible to explore the segments of the labor markets in which the drops in gaps have been more pronounced. Fig. A2 in the on-line Appendix shows confidence intervals for the earnings gaps in different segments of the labor markets circa 1997. Comparing this with Fig. A1 in the same Appendix, which shows comparable confidence intervals circa 2007, it can be seen that the bigger drops in earnings gaps for pre-school and elementary teachers occurred among younger individuals, those with higher education (secondary complete or more), with no elders at home, who are part-time workers and those without second jobs. For high school teachers, the earnings gaps are more pronounced among heads of household and those holding more than one job. Among these teachers there is no particular segment of the market in which the gap dropped especially more than the rest.

6. What can explain the evolution of the wage gap among these countries?

According to Cuenca (2014) teachers' careers in Latin America are heterogeneous in terms of its legal nature, technical orientation and internal organization. To an important extent this is the result of changes that have happened during a long period. In fact, nowadays in Latin America, teachers' careers designed in the 1950s coexist with those recently implemented.

Nonetheless, it is possible to classify teachers wage policies in three groups, according to the intensity and extent of monetary incentives. The first group, which includes most countries of the region, is characterized by (i) a flat salary progression over teachers' careers, (ii) promotion policies mainly linked to seniority, and (iii) weak incentives associated to teachers' performance (Umansky, 2005; Cuenca, 2014).

The second group includes countries which offer differentiated, competency based pay increases to teachers for small periods on top of the traditional, seniority based career path. These programs include individual and collective (school-level) performance evaluation and incentives. Chile, Bolivia and El Salvador have implemented this type of policies (Bruns and Luque, 2014; Mizala and Schneider, 2014)[7]. Chile implemented a school-based bonus pay in 1996 where all teachers of the schools performing well relative to schools that serve children from similar socio-economic

[7] Since 2008 at least 20 different states and municipalities in Brazil have introduced school-based bonuses linked to performance.

backgrounds get the bonus for two years. In 2004 the amount of the bonus was significantly increased, as well the proportion of schools that got awarded. Later, individual teacher bonus rewarding knowledge and skills were implemented: Pedagogical Excellence Award for all teachers (AEP) in 2002 and an incentive associated to the compulsory performance evaluation of public school teachers (AVDI) in 2004. Bolivia experimented with several types of pay-for-performance models, although none were ultimately institutionalized. In 1998–1999 the government designed individual incentives based on teaching sufficiency examinations. The government, however, dropped this program and in 2001 implemented a system of collective incentives based on schools' self-evaluations. Schools in El Salvador in the 2000s went through a series of different evaluations and collective monetary incentives for teachers. After the two initial rounds the program was watered down: 75% of schools received the bonus in 2003, 85% in 2004, and 95% in 2005, thus, it turned out in a salary increase for almost all teachers.

The third group includes countries that have implemented career path reforms incorporating competency-based promotion and pay. These reforms try to decompress the salary scale, with salary increments associated with grade promotion contingent on competence, rather than simply seniority. However, these are recent reforms that go beyond the period of our study: Ecuador in 2009, Peru in 2008, Brazil (state of Sao Paulo) in 2010, and Dominican Republic in 2014 (Bruns and Luque, 2014; Cuenca, 2014)[8].

Contrasting the timing of the incentives and career reforms of the three groups with our period of analysis it can be concluded that the wage gap reduction we document here can be explained by a uniform increase in teachers' salaries not associated to teachers' performance evaluation. This is clearly the case in Dominican Republic where salaries of all teachers and school principals were increased during the period. In Brazil the government created a fund for the development and improvement of education, 60% of the fund was allocated to increase teachers' salary. In Panamá there was an increase in teachers' salaries in order to make them equivalent to those of other professionals. In Chile, before and during the introduction of incentives, there was a significant increase in teachers' salaries, higher than the increase in the country's average salaries (Mizala and Schneider, 2014).

Also, for Chile, El Salvador and Bolivia, the incentives describe above could also explain the decrease in the wage gap between teachers and other professionals and technicians, especially among those teachers in the upper part of the conditional earnings distribution.

In contrast, Costa Rica, Honduras and Paraguay, where the wage gap increased during the 1997–2007 period, are clearly countries of the first group, with a relatively compressed wage structure, and promotions across the career path driven almost entirely by seniority, delinked from performance. In these countries no significant salary increase took place during the period of the study.

Finally, the case of Nicaragua where there is a significant decrease in the wage gap for preschool and elementary school teachers and an increase in the gap for high school teachers. Two elements could explain this contrasting behavior. First, the formal educational level of preschool school and elementary school teachers is less than the one of high school teachers, because only high school teachers are educated at the University level, therefore, their comparison group belongs to different segments of the labor market. Second, in Nicaragua the female share of the high school teaching force has been dropping during the period analyzed, and as Mizala and Romaguera (2005) show female teachers earn more than their counterparts, while male teachers earn less than similar workers in other sectors of the labor market.

[8] The Chilean Congress is discussing a new Bill that establishes a comprehensive Teacher Career path.

7. Conclusions

This paper examines teachers' earnings in Latin America with respect to those of other professionals and technicians between circa 1997 and circa 2007. Since the available empirical evidence has shown that the sign and magnitude of the conditional earnings differential between teachers and other workers crucially depends on the definition of the comparison group, we use a methodology that compares workers (teacher and other professional and technicians) with the same observable characteristics. Beyond being more precise in measuring the earnings gaps, this approach also provides insights into the distribution of unexplained pay differences. Furthermore, using a matching after matching approach we are able to provide further insights on the change of the earnings gap during the decade under analysis.

The results show that teachers are underpaid vis-à-vis other professionals and technicians in Latin America in both periods: circa 1997 and circa 2007; nonetheless, these gaps decreased through the decade mainly through a uniform increase in teachers' salaries not associated to teachers' performance evaluation. However, there is an important cross-country heterogeneity behind the region averages. In particular, Brazil affects greatly the region averages due to its size. Despite this, the main conclusions hold if we include Brazil or not: High school teachers are more educated than other professionals and technicians but their years of education are not properly rewarded in the labor market. The earnings gaps are higher for middle age workers -and this is specially faced by pre-school and elementary school teachers-, for the highly educated, for those with children in their households and those holding more than one job.

Working part-time is a characteristic that explains teachers' underpayment, mainly for pre-school and elementary school teachers. This could be explained as some sort of compensating differential that in many circumstances is used as a way of managing the family-work trade-off. It could be hypothesized that those individuals with prospects of raising a family and the desire to devote time to it opt for the teaching profession, accepting the possibility of lower earnings. But this would require further exploration.

We find that teachers are also being underpaid in their second job vis-à-vis other professionals and technicians, although these differences are smaller than in their main job, and also decreased throughout the decade. The results suggest the existence of unobservable characteristics that differ between teachers and their peers and seem to be explaining part of the gap. Additionally, job stability has been found to be another salient characteristic within the teaching profession, especially in the public sector. The returns to job tenure among teachers, however, were found to be smaller than those among other professionals and technicians. Within this portrait, the issue of selection into the teaching profession becomes especially relevant and calls for policy attention.

Moreover, important differences along the earnings distribution were found. Teachers in the highest percentiles of the earnings distribution earn less than other professionals and technicians. At the same time, teachers in the bottom percentiles have similar or higher earnings than comparable workers. This can be explained because in many countries teachers are rewarded through a single salary schedule which implies a salary structure much more compressed than the one of other professionals and technicians. For this reason, several countries are reforming traditional mechanisms of paying and rewarding teachers in order to attract and retain highly qualified individuals into teaching (Bruns and Luque, 2014).

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ijedudev.2015.11.014.

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