Universidad de San Andrés

Departamento de Economía

Licenciatura en Economía

Teacher Salary Differentials: an Empirical Analysis of the Incentives Teachers Face in Argentina in 2013

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Victoria, Buenos Aires, Diciembre 2016

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Abstract

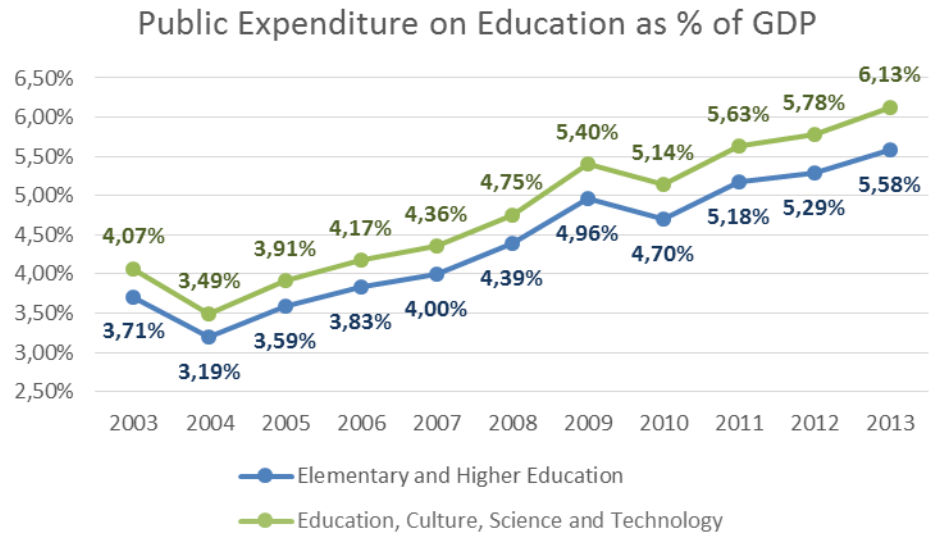
What incentives do teachers in Argentina face today? Are teacher salaries high enough to attract and retain workers in this profession? Do teachers earn salaries at the same level as other workers, or do they fare better or worse off than non-teachers? This paper runs an OLS model to estimate the teacher salary differential in Argentina in 2013. Controlling for observational characteristics of human capital and using data from the 2013 Permanent Household Survey (EPH), the model estimates whether teachers in Argentina earn more (or less) in comparison to individuals of similar characteristics in non-teacher occupations. The objective of this paper is to find whether individuals who choose to become teachers face a higher monetary opportunity cost than individuals who choose other professions. The results indicate that when considering income per month, teachers on average perceive a salary 13.5% lower than non-teacher workers of similar characteristics. However, when considering salary per hour, the teacher salary differential is positive (between 11% and 14% higher than non-teachers' salaries). Because of how the market is structured in Argentina today, we understand that individuals cannot choose the amount of hours worked per month and are therefore more likely to consider monthly salary differential when estimating their opportunity cost and choosing a suitable profession.

I. Introduction

In the last decades, there has been a shift in political interest towards education, particularly in developing countries. In Latin America, governments have increased the percentage of GDP invested in education. Particularly in Argentina, as shown in figure 1, public expenditure on education increased from 3.71% of the country's GDP in 2003 to 5.58% in 2013.[1] Meanwhile, international organisations, such as the Inter-American Development Bank (IDB), have published continuous articles aiming the focus at educational quality. Through the IDB, Hugo Ñopo has repeatedly written about the lack of incentives faced by teachers in Latin America, noting a reduction in young professionals who choose to study teaching, and highlighting the deficiencies of the teaching institution in our countries, from low salaries to unattractive working conditions. In June 2015, the IDB published an article on how the education institutions fell short in attracting the best professionals. Focusing on Latin America, the article highlights the opportunity cost that potential teachers face when choosing their occupation. The main emphasis is placed on the salary differential (Ñopo, 2015). Specifically in Argentina, National Organisation CIPPEC (Centro de Implementación de Políticas Públicas para la Equidad y el Crecimiento) published a book in October 2014 titled "*Apostar a la docencia*". *Betting on Education* analyses the challenges and possibilities faced by educational policies in the country. In 2015, a working paper by the same organisation proposes 10 policies to better Argentine education, one of which focuses exclusively on bettering teacher formation and proposes a final admissions exam into the profession. The authors hold that this exam would serve to bring prestige to the professional and standardise teachers' profiles (CIPPEC, 2015).

[1] Data from the National Secretary of Economic Policy and Development retrieved November 2nd 2016 from http://www.economia.gob.ar/secretarias/politica-economica/programacion-macroeconomica/otras-publicaciones/. This percentage was calculated as the amount of money invested in "Basic Education", "Superior and University Education" and "Education and Culture" over total GDP. If we also consider the category "Education, Culture, Science and Technology", the percentage grows from 4,07% to 6,13%.

Figure 1: Public Expenditure on Education as a Percentage of GDP in Argentina between 2003 and 2013



Source: Elaborated with data from the National Secretary of Economic Policy and Development.

The returns to education, the Mincer equation (1974), and the role of education in growth and development have long been studied in the field of Economics and there is little discussion as to the vital importance of investing and nurturing the future generations of our countries. As Hanushek and Woessmann review in 2010, education impacts economic growth through three main mechanisms: 1) increasing human capital and thus labour productivity, 2) increasing innovative capacity and the technological factor of growth and 3) increasing the transmission of knowledge and bettering the use of technological advances. In *Education and Economic Growth*, Hanushek and Woessmann show an empirical relation between test scores (OECD's PISA Tests) and long-run economic growth.

In this respect, Argentina was once recognized for its public educational system, but now ranks low in international rankings for primary and secondary education. In 2012, in international school tests (OECD's PISA Tests), the country's students scored lower than the OECD average in all categories – mathematics, reading comprehension and science[2]. National student evaluations, the ONE tests, have ceased to be published; they have lost prestige and validity, and the quality of student achievement has decreased. In its latest shift in educational policy, the national government has published the last ONE tests from 2013 and introduced new nation-wide student achievement tests named

[2] Final results and comments on PISA 2012 retrieved November 2nd 2016 from https://www.oecd.org/pisa/keyfindings/PISA2012_Overview_ESP-FINAL.pdf.

"APRENDER"[3] aiming to gather information about student outcomes and pinpoint pending challenges for both public and private education institutions. Although in tertiary and university level education the country maintains its reputation of good quality and accessibility, this creates worry as to the jump in effort that students face when graduating from secondary school. In consequence, students may react to the extra demand by lowering attendance, choosing easier fields of study or even dropping out of university. In the PISA 2012 results, Argentina came in highest in the percentage of students who admitted to having skipped classes with 66% of affirmative answers (along with Latvia, 67% and Turkey, 65%). National statistics sustain that only 5 in 10 children complete secondary school, 1 in 10 graduate from university. These statistics are sensitive to social classes and rural areas, hinting that the most vulnerable social groups are the most affected.[4] The consequences on the country's economic potential are all but debatable.

If we are concerned with educational quality and student achievement, and we believe that these are directly or indirectly related to teacher quality and quantity recruitment, we must ask ourselves: what incentives do teachers face today, and how does this impact teacher recruitment and educational quality?

This paper will focus on answering the first part of the question with empirical data, studying the link between an individual's choice to become a teacher, and their income.

This thesis estimates the teacher salary differential in Argentina in 2013. The population is separated into two groups – teachers and non-teachers – which are compared based on demographic and occupational related characteristics. Once the main differences are pinpointed, OLS estimations are carried out for the entire sampled population as a whole, and then carried out again discriminating the population by gender. This paper is organised as follows: in section II I state a quick review of past literature with similar estimation strategies (Razquin 2004, Herrero et al. 2004) to understand the situation hitherto. In section III I present the data and sample limitations and analyse main observational characteristics of the population sampled. In section IV I present descriptive statistics of

[3] Article in La Nacion discussing ONE results and new national APRENDER tests retrieved November 2016 from http://www.lanacion.com.ar/1892047-el-18-de-octubre-se-lanzara-aprender-el-nuevo-operativo-nacional-de-evaluacion-educativa

[4] In April 2016, the National Minister of Education presented these statistics in the Senate before the Education Commision. Article in La Nación retrieved November 2016 from http://www.lanacion.com.ar/1888789-hoy-la-mitad-de-los-jovenes-no-termina-el-colegio-secundario-dijo-esteban-bullrich

the restricted sample and justify the choice of variables included in the OLS model, and in section V I present the estimation results. Finally, main findings are discussed in section VI and concluding remarks are made.

If teachers in Argentina face a salary differential, earning less than workers in other occupations, potential teachers will face a larger opportunity cost than non-teachers and may be encouraged to choose a non-teaching occupation with a higher expected income in the future.

If we assume, within the economic framework of supply and demand, that individuals with more human capital are better qualified and can achieve higher salaries, and we know teacher salaries range in a smaller window than non-teacher salaries (Table 5), we can assume that the better qualified potential teachers will face larger opportunity costs than teachers of lower qualifications. If high quality teachers maximise their expected income, they will not choose teaching as their main occupation. In this case, the incentives teachers face could be encouraging high quality potential teachers to choose alternative, better paying occupations. In this paper we look at the teacher salary differential to study if teachers do, in fact, face a larger opportunity cost than non-teacher workers. What other incentives potential teachers face and how these incentives impact the quality of the professionals attracted to and retained by the profession are questions that exceed the econometric analysis of this paper.

II. Literature Review

Between the late 1990's and today, many papers have recognised the impact of education on economic development and focused on finding the key to increase educational quality and thus student outcomes, analysing the Education Production Functions and Political Economy of Educational Production (Carnoy, 1995; Hanushek, 1995; Hanushek & Woessmann, 2010). Additionally, research has been carried out analysing qualitative characteristics of educational institutions, discussing the possibilities and challenges faced by teachers and seeking opportunities to increase the level of student achievement in hopes of guaranteeing future growth and development (Morduchowicz, 2002; CIPPEC, 2014; CIPPEC, 2015).

According to CIPPEC (2014), the incentives faced by teachers do not manage to attract the most competent and committed professionals. Additionally, they diagnose a coordination failure that leads to teacher unemployment in some areas and lack of supply of teachers in others. Zooming in on salaries, they describe that while between 2003 and 2008 teacher real salaries were favoured and benefited from a recuperation that left them 50% higher than in 1996, from 2008 onwards the wage raises only served to meet inflation, consequently leaving teacher real salaries stagnant.

In this framework, more quantitative analysis has focused on the economic aspect of the educational issues and market consequences of the relation between educational quality, teacher capability and student achievement. Razquin (2004) analyses the salary differential in 1987 and 1996, seeking to link salary differential to shortage of teachers, teacher quality, motivation, attendance rates, teacher mobility across districts and teacher turnover. Focusing on her 1996 results, she finds that teachers with a higher education (university and other post-secondary degrees) in Argentina earn significantly more on an hourly basis than do similarly educated women in other occupations. Monthly earnings show no significant differences between teachers and non-teachers. For her estimations, Razquin uses an OLS model which she controls for selection bias with the Heckman methodology. Herrero, De Santis and Gertel (2004) also correct their OLS estimations for two types of selection bias using the Heckman methodology: the choice of entering the Labour market (choosing to be employed) and the choice of working as a teacher. Using data from 1998 and 2002, they find that, for women, 13% of the salary differential is explained outside of the labour market and is attributable to the decision of becoming a teacher and/or the decision to participate in the labour market. The remaining 87% of the salary differential is due to in-market discrimination. In 2003, Herrero, De Santis and Gertel use the Oaxaca decomposition to explain whether teacher salaries in Argentina are high or low relative to other professions. This paper, using the 1998 EPH, finds that teachers were, on average, better paid than the median salary in the country. In 1999, Vegas, Pritchett and Experton ask themselves how to attract and retain qualified teachers in Argentina. They compare teachers' salaries to those of non-teachers in the country and estimate the teacher salary differential using the 1997 EPH. They conclude that, because of geographical differences in pay, a national pay raise would not be the best solution as other policies may have a higher educational return per dollar. They sustain that adjustments per province would succeed in making the profession attractive across the country.

In her Work Plan for CONICET, "The Opportunity Costs for Teaching: Variations in Urban Labour Markets and Changes in the Last Three Decades", Razquin resurfaces her 2004 analysis to answer further questions: Do teachers face a higher opportunity cost simply for being teachers? If they do, why is that? Has the salary gap worsened over the years? If so, why? She addresses issues such as professionalising the teaching occupation and improving qualifications of future and current teachers, hoping that this will have an impact on teacher quality, student achievement, and educational outputs.

Facing these issues and based on this information, I use an OLS estimation and focus on data from 2013 to analyse if the general situation varies from the one Razquin finds in 1996 and Herrero et al. describe in 1998. I restrict the sample by age and education and estimate teacher salary differentials for the population sampled as a whole and later estimate separately both for women and men.

III. Data, Sample and Limitations

For this study I use the country's 2013 fourth trimester Permanent Household Survey (EPH in Spanish). This sample holds 56,198 individual observations. Although the data set includes a survey on household characteristics, this paper focuses on the individual traits of the population to analyse the incentives faced by potential teachers. This data set has intrinsic limitations. Primarily, the answers are self-reported. For questions regarding income, it is understood that individuals are prone to under declare income. In the case of teachers, because their jobs require work outside of school, it is also discussed that these individuals tend to misreport hours worked per week as they may not contemplate hours worked outside the workplace, (Razquin, 2005).

To begin analysing the sample, I create all the variables I will need to carry out the analysis. I first create our variable of interest: *dteacher.* This is a dummy variable that interacts the individual's occupation with their branch of economic activity. We consider an individual a teacher if both their main occupation and their branch of economic activity indicate teaching. The dummy variable takes the value of 1 when the individual declares teaching as their main economic activity (the variable for branch of economic activity takes the value of 8501 or 8509; this is elementary, secondary, higher education or "other" teaching) and simultaneously declares their main occupation to be educational

worker (the variable for main occupation takes the values 41.3.1.1 through 41.3.1.4). Here, I must clarify that if there are teachers who report to be working in other branches of the economy, they will be considered as non-teachers. I also create variables for level of education attained and years of work experience.

To create level of education attained, we look at two original survey variables. The survey asks individuals two questions regarding education. The first question refers to the last level of education completed, where higher education is grouped in one category (nivel_ed) [5]. The other question refers to which sort of institution was attended (ch12). For our analysis, we use a variable I create: *CrossEd*, which is the result of recoding the original variable in the data set "nivel_ed", having in mind the values taken by variable "ch12". This allows a more detailed look at the level of education attained, since it allows us to differentiate higher education between a post-secondary non-university degree (tertiary education), and a university education which groups undergraduate and postgraduate degrees. *CrossEd* can take any value between 1 and 9, each value indicating the level of education reached and whether or not this level was completed[6].

For potential years of work experience we calculate the number of years the individual has dedicated to their education by converting the level of education attained to years invested.[7] The potential years of work experience are then the individual's age, minus 5 (the age at which children enter school), minus the years spent in education.

Other variables of interest were created to indicate if an individual worked for the private sector, whether or not they received non-monetary benefits from their main occupation, and whether or not they had more than one job. For household structure variables we include dummy variables to indicate if the respondent is married or single, and if the respondent is the chief of household or if they are the chief's spouse. To understand if the individual faced a particularly high or low need for income in their household, a variable named Income Base was created. This variable indicates the individual's household income before adding the individual's monthly income: Total Family Income – Individual Total Monthly Income. For an individual who faces a high income need, the variable Income

[5] The original variable included in the survey is "nivel_ed" which allows a variety of answers ranging from elementary to higher education, complete or incomplete. Using this variable to describe the sample yields similar conclusions, but overlooks the difference between tertiary degrees and university degrees.
[6] A more detailed explanation of *CrossEd* can be found in appendix Table 2.
[7] Find the conversion detailed in the appendix Table 3.

Base should be relatively low in comparison to other individuals. A more detailed explanation of all the variables used in the analysis can be found in Table 1 of the Appendix.

Before approaching the OLS Estimation, I analyse the main characteristics of teachers and non-teachers in the data set. Once I define *dteacher*, I find that teachers represent 2.4% of the total sample and 5.6% of the Economically Active Population (EAP), as opposed to non-teachers which represent 38.3% of the total sample and 88.8% of the EAP. We understand the EAP as the sum of all the individuals capable of working, whether employed or unemployed but actively searching for a job.[8] The remaining percentage of the EAP is unemployed with no reported occupation[9] and therefore appears as a missing value for the variable *dteacher* in Table 1.

After this initial understanding of the sample, I zoom in on basic demographic and educational variables to evaluate if these take differentiated values according to the value of *dteacher*. In other words, I want to know if teachers in Argentina are on average the same age, gender and achieve the same level of education, as their non-teacher counterparts. I share my findings in Table 1. In summary, it is observed that teachers are on average slightly older than non-teachers (1.5 years), with a smaller standard deviation. The main differences arise in gender and level of education attained. In the subgroup teachers, women compose 76.7% of the sample. This means that more than three of every four teachers are women. Meanwhile, women represent only 39.7% of the non-teacher workforce. Although 40% of the labour force in other occupations is a high percentage for women to represent, reflecting an improvement in the range of options available for women in the working world versus 1998 (35.7% in Herrero, De Santis, & Gertel, 2004) there is still a clear gender gap that makes teaching more attractive to women than men.[10]

Finally, I look at the level of education attained. The difference observed is not only surprising but also positive. To analyse this characteristic between the different subsamples I use the variable *CrossEd*. With this variable, we find that over 81% of teachers attain and complete higher education (university

[8] The EPH understands an individual is unemployed if that individual has actively searched for a job in the last week – be this sending out resumes or going on interviews. EAP is therefore all employed individuals + all unemployed individuals.
[9] Individuals who have not yet had their first employment do not declare an occupation.
[10] The questions that arise here are whether this difference reflects women's preference for professions that require less hours of work per week, or if it reflects a level of gender bias in the labour market. Regardless, it is a question that exceeds the scope of this paper. I highlight the fact that over 20% of the teaching work force is male. This is novel, as in comparison to the teachers in 1998, (15% of teachers were male in Herrero et al. 2004) the popularity of this profession among men has increased.

and tertiary degrees) while only roughly 17% of the labour force in other professions attain and complete this same level of education. The difference between the two groups hints that there is a stronger prerequisite for educational qualification in the teaching profession relative to that in other occupations. This most probably elevates the quality of working teachers. Within the subgroup "complete higher education", two of every three teachers completed Tertiary Education; the third completed University. This ratio is inverted when we look at non-teachers. This is most probably linked to the fact that argentine law requires teachers to complete at least a tertiary degree before being allowed to practice. This requisite has changed progressively over time. While before 1969 teachers attained their title when completing high school, the law later required Secondary School teachers to complete tertiary or university levels of education before being allowed to work. In 2006, the national education law requires also primary teachers to complete a 4 year tertiary degree. The small percentage of teachers without higher education (19%) could represent the older generations, which became teachers before the education requisite was in order. It is also possible that some teacher trainees begin to work as teachers before attaining their credential. This reality could be the market's response to a shortage of teachers and is another explanation for the existence of teachers without a complete higher education (tertiary or university).

Table 1: demographic and educational characteristics of individuals surveyed in EPH 2013

Variables	All Population	EAP	Teachers	Non-Teachers
Gender (% female)	52.08%	42.32%	76.67%	39.69%
Age	33.5	39.5	41.4	39.9
Standard Deviation	22.2	13.3	10.5	13.3
% over 64	10.96%	3.24%	2.37%	3.41%
Min	-1	10	20	11
Max	98	92	89	92
Education (%)				
Elementary Incomplete	15.97%	4.33%	0.00%	4.61%
Elementary complete	15.06%	17.11%	0.81%	18.29%
Secondary Incomplete	20.44%	17.98%	0.96%	18.59%
Secondary complete	17.48%	27.45%	5.70%	28.81%
Tertiary Incomplete	2.83%	3.76%	2.96%	3.70%
Tertiary complete	5.08%	9.04%	53.11%	6.51%
University incomplete	7.58%	9.12%	8.07%	8.97%
University complete	5.56%	10.97%	28.37%	10.27%
No instruction	10.00%	0.26%	0.00%	0.26%
Total number of cases	**56,198**	**24,253**	**1,350**	**21,533**
% of All Population	100%		2.40%	38.3%
% of EAP		100.0%	5.57%	88.8%

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

Based on these initial results, I restrict the analysis to a subsample by limiting the values age and education attained can take[11]. I do this in order to work with subgroups as similar as possible; limiting the observational differences between the group of teachers and non-teachers to assure myself that there are as few as possible intrinsic differences between the individuals in each group which can interfere with my coefficient estimations. In a first attempt to analyse the subsamples, I separate men from women, believing they face different incentives in the working world. However, carrying out the analysis for both genders separately, I find similar results across subsamples. For this reason, prioritising a larger set of observations, I carry out the analysis for both men and women pooled. Secondly, I limit the range of age from 20 to 65 years of age. The inferior bound was defined based on the fact that the youngest teacher in the total sample is 20 years old. This is consequent with the

[11] The analysis originally separated men from women. However, the estimated salary differentials were similar among both subsamples, reason for which I choose to join subsamples and increase number of observations. I include the differentiated estimations in the Results Section, Table 6.

minimum years of education required to attain a teaching credential (years of education plus years of teacher training). The superior bound is 65 – as the current legal age for retirement in Argentina is 65. Finally, I limit the sample according to education, keeping only the individuals with incomplete tertiary degrees and above, excluding individuals with only complete secondary education and any level below that. This is because, as teachers are required at least a tertiary degree, keeping individuals with a lower level of education in the sample could lower the mean salary of non-teachers who may not need higher education to begin working. This could therefore underestimate the salary differential.

As can be seen in table 2, in the remaining sample restricted by age and education, there are 10,450 individual observations, of which 7,730 compose the Economically Active Population. Of this subsample, 16% are teachers while 80% are non-teachers – 4% do not have a declared occupation. When isolating the female population we find that 23% of the EAP are teachers, and only 8% of the male EAP subsample chooses that same profession.

Table 2: Teacher Population as a Percentage of Total Population and EAP

Variables	All Population	EAP	Teachers	Non-Teachers
Restricted Population	**10,450**	**7,730**	**1,223**	**6,145**
% of All Population	100%		11.7%	58.8%
% of EAP		100%	15.8%	79.5%
Female Subsample	**6,150**	**4,233**	**954**	**3,047**
% of All Population	100%		15.5%	49.5%
% of EAP		100%	22.5%	72.0%
Male Subsample	**4,300**	**3,497**	**269**	**3,098**
% of All Population	100%		6.3%	72.0%
% of EAP		100%	7.7%	88.6%

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

IV. Methodology and Variables

To estimate the salary differentials and find whether being a teacher as opposed to choosing another profession, *ceteris paribus*, affects an individuals' salary, I use an OLS model based on the Mincer Earnings Equation. Although this model has limitations, a more sophisticated approach exceeds the scope of this study. The dependent variable used is the log of income, calculated using total income

per month (variable p47t), so as to not limit income to the main occupation. I take this precaution because I believe that it is the total possible income that a person considers when calculating their opportunity cost. For example, if an individual believes that becoming a teacher will allow them to use their free time on a second job, they include that second possible income in their considerations.

The dependent variable chosen to carry out the estimation is then the natural logarithm of the total salary measured either per month or per hour. For Model (A), we calculate the hourly salary differential. To calculate salary per hour, we take the individuals' total monthly income (variable p47t) and divide it by the total hours of work per month. To calculate total hours of work per month, we add the number of hours worked per week in the main occupation and in other occupations, and multiply that number by four to attain hours per month. For Model (B), we analyse natural logarithm of salary per month (using the variable p47t).

When determining which independent variables to include in the OLS regressions to find the correlation between the teaching profession and monthly/hourly income, I study the differentiating characteristics of the two subgroups (teachers and non-teachers). Having limited the samples to individuals in working age (20 to 65) and those with education degrees ranging from incomplete tertiary degree to complete university education, I study the average values critical variables take in the subgroup of teachers and compare these to the values the same variables take in the subgroup of non-teachers. I initially undertook this task by separating women from men and analysing the difference between teachers and non-teachers separately by gender. However, the differences between teachers and non-teachers maintain themselves across both gender groups. For this reason, I chose to pool men and women together to increase the number of observations. In the Appendix Tables 4 and 5, I show descriptive statistics differentiated by gender. In this section, we analyse the differences in the pooled sample.

The variables analysed range from demographic (average age, level of education, marital status and relation to the head of household) to work related attributes (such as average hours worked per month and week in main occupation and other occupations, average years of work experience, whether or not the individuals hold more than one occupation, and income information ranging from salary per hour to income base in the household). The results are shown in Tables 3 and 4.

Table 3: Descriptive Statistics for Demographic variables in the restricted sample population

Variables	Teachers	Non-Teachers	Difference
Gender (% female)	78%	50%	28.4 pp
Age	41	39	2
Standard Deviation	10	11	-2
Min	20	20	
Max	64	64	
Education (%)			
Tertiary Incomplete	3%	13%	-9.4 pp
Tertiary Complete	58%	22%	35.7 pp
University Incomplete	9%	30%	-21.8 pp
University Complere	30%	34%	-4.4 pp
Relation to Chief of HH (%)			
Chief	38%	50%	-11.3 pp
Partner	42%	24%	18.4 pp
Other*	19%	26%	-7.1 pp
Martial Status (%)			
Married	64%	58%	6.4 pp
Single	25%	33%	-8.7 pp
Other**	11%	9%	2.3 pp
Total number of cases	**1,223**	**6,145**	

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

*The category "Other" for Relation to Chief of Household includes sibling/child/grandchild/etc.

**The category "Other" for Marital Status includes widowed and divorced.

As shown in Table 3, above, one of the main differences between teachers and non-teachers arise in level of education attained. While 88% of teachers in 2013 had completed higher education and obtained a degree, only 56% of their non-teacher counterparts had the same qualifications. We note that Argentine law requires teachers to obtain a tertiary degree if not a university diploma. This explains why in the teaching subgroup, over 60% of individuals attend a tertiary institution while this proportion is reduced to almost half its' size in the non-teacher population (35%). This law requisite also explains why the percentage of working teachers without complete higher education is as low as 12% while the percentage of individuals without a higher education degree working in other professions is as high as 43%. In terms of age and gender, we observe the same differences in the restricted sample as we did in the total population: teachers have an average age slightly above the

mean in other professions, and more than 3 of every 4 teachers are female, while women represent only 50% of the non-teacher workforce.

Looking at household structure, interesting differences arise between teachers and non-teachers. 42% of teachers are the partners of the head of household, while only 24% of non-teachers have this role. If we understand the head of household of be the main source of income, this may hint that individuals choose to become teachers if they know they do not represent the main income for the household. Similarly, in comparison to non-teachers, a larger percentage of teachers are married, and a smaller percentage of teachers are single. These statistics seem to indicate that when choosing their job, teaching loses appeal to individuals who are responsible for the main income in the household or to individuals who do not count with a stable partner with whom to share expenses. However, the results of the National Census of Educational Establishments' Personnel carried out in 2014 seem to indicate otherwise (CENPE, 2014). This census surveys individuals working in educational establishments. When asked whether they represent their household's main income, 67% of respondents answered they do, while 33% of respondents indicated otherwise. Firstly, I highlight that 19% of the sample did not respond to this question, so the percentages above are taken from the 81% of the responding sample. Secondly, this census applies to all workers, both teachers and staff. Of the entire surveyed personnel, 81% performs functions in front of students, while 19% perform functions such as cleaning, technical support, administrative tasks, *et cetera*. Based on this information, it is difficult to arrive at a conclusion about whether teachers choose teaching because the salaries are attractive, keeping in mind their household income need, or if they choose teaching because they do not have another choice, or because they are not qualified enough to face a higher expected income in another profession. What we can highlight are the results shown in the table above, where a larger percentage of teachers are married and a lower percentage of teachers are Chief of Household than non-teachers.

Beyond these assumptions, empirical differences between the two subgroups in occupational and income related variables are shown below, in Table 4.

Table 4: Descriptive Statistics for Income and Occupational variables in the sample population

Variables	Teachers	Non-Teachers	Difference
Years of Work Experience	21	20	1
Standard Deviation	9	11	-2
Private employee	24%	68%	-44.1 pp
Two occupations (%)	27%	10%	16.6 pp
Benefits			
Paid Vacations	96%	63%	32.8 pp
Health Care	97%	64%	33.1 pp
Retirement	96%	62%	34.1 pp
All benefits	96%	62%	33.9 pp
Income			
Main Occupation Income per Hour	$56	$43	$13
Standard Deviation	$32	$38	-$6
% missing	10.06%	2.95%	
Total Income per Hour	$58	$46	$12
Standard Deviation	$41	$48	-$6
% missing	10.06%	2.95%	
Main Occupation Income per Month	$5,089	$6,219	-$1,131
Standard Deviation	$2,707	$4,710	-$2,003
Total Income per Month	$6,300	$6,854	-$554
Standard Deviation	$3,705	$5,232	-$1,527
Total Family Income	$13,027	$13,325	-$298
Standard Deviation	$7,042	$8,606	-$1,564
Income Base	$6,726	$6,471	$256
Standard Deviation	$5,964	$6,489	-$525
Hours per month	105	157	-52
Standard Deviation	56	65	-9
% missing	0.08%	0.20%	
Hours per week Main Occupation	22	38	-15
Standard Deviation	12	16	-4
Hours per week Other Occupations	4	2	2
Standard Deviation	8	6	2
% missing	0.08%	0.03%	
Total number of cases	**1,223**	**6,145**	

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

Besides the difference in years of experience - which can be explained by the difference in average age and how the variable experience was created - important differences can be found in the values of occupational variables. Teachers work, on average, two thirds the number of hours per week in their main occupation than non-teachers do (22 hours per week versus 38 hours per week). This may be explained by part-time teaching in elementary schools or teaching only particular subjects, but it may also be a sign of underreporting on behalf of the teacher subgroup. In line with having more time off work, teachers are more than twice as likely as non-teachers to hold more than one job (27% of teachers have more than one occupation versus 10% of non-teachers who report to have worked more than one job the week prior to the survey). This difference hints at the possibility that, given that some teachers work part-time in elementary schools or teaching only particular subjects, the lower number of hours worked per week allow them the possibility to hold a second job. This second job increases the total monthly income and thus may make the profession more attractive.

Other differences include the percentage of individuals who are private sector employees. Only 24% of teachers work in the private sector or private schools, while 68% of non-teachers work in that sector of the economy. This is coherent with the fact that public schools and universities are common and still hold prestige in Argentina. Especially in provinces and rural areas, the public sector is predominant. We also take a look at non-monetary benefits. The EPH asks the respondents whether their main occupation offers health care, paid vacations and a discount for retirement. When we analyse who receives these benefits, we find that 96% of teachers receive all three measured work benefits while only 62% of non-teachers count with these fringe benefits. This is a positive sign given that, if individuals are aware of this, then it might be an extra incentive for young adults to study teaching and benefit from these non-monetary retributions. However, it may also be an attempt on behalf of the employer to compensate for unattractive salaries or working conditions.

In terms of monetary remuneration, we observe important differences between teachers and non-teachers, but these differences vary according to which measures of income we consider. If we look at income per hour, teachers earn, on average, more than non-teachers. If we consider income per month, teachers earn less than non-teachers. This may be consequence of how income per hour is calculated, as it depends on the hours per month reported by the individuals. As mentioned earlier, because teachers are required to work outside the workplace when planning lessons and grading papers/evaluations, it is possible that individuals misreport hours dedicated to their main occupation

because they do not consider the hours worked from home or outside of schedule. This would bump up their salary per hour. This is found to be the case in Allegretto's "How does teacher pay compare?" a book reviewed by Paula Razquin in 2005. In her book review, Razquin mentions Allegretto's finding that in traditional weekly hours worked, full-time occupations tend to report hours worked including lunchtimes and work breaks, while teachers tend to exclude lunch and other work breaks, as well as hours worked outside of school.

In terms of Total Family Income, teachers' families have a lower income with about the same standard deviation. Similarly, when we consider Income Base, calculated as Total Family Income minus the individual's income, we find that teachers have a lower Income Base than non-teachers – thus a higher income need in the household.

Based on these results, I choose the independent variables to include in the model; the ones whose means vary the most between the subgroups. Specifically, I include *d2occupations*, *dallbenefits, dprivate,* hours worked per month, and the variables used commonly in the Mincer equation (human capital understood as highest level of education attained and years of work experience and work experience squared). Other variables such as *dmarried* and *dspouse* were included in variations of the estimated model but were finally excluded because their impact on the dependent variable was zero or not significant, and they did not change the sign, magnitude nor the significance level of the coefficient for the dummy teacher.

V OLS Estimations and Results

To carry out the estimation, we run two OLS models for two groups of variables, leaving us with four sets of results. In Model (A) the dependent variable is the natural log of hourly income. In Model (B) the dependent variable is the natural log of monthly income. In both models we make sure we consider total income perceived, since this is the income the individual will take into account when calculating their opportunity cost of choosing one profession over another.

For each model, we run two regressions: one with the basic Mincer Equation variables and one with additional independent variables to control for other intrinsic individual traits and avoid omitted variable bias.

The equations estimated for each model are then:[12]

1. $lnS = s_0 + \beta_1\, dteacher_i + \beta_2 dTC_i + \beta_3 dUC_i + \beta_4\, exp_i + \beta_5 exp_i^2 + \beta_6\, dmale_i + \varepsilon_i$
2. $lnS = s_0 + \beta_1\, dteacher_i + \beta_2 dTC_i + \beta_3 dUC_i + \beta_4\, exp_i + \beta_5 exp_i^2 + \beta_6\, dmale_i + \beta_9\, d2occup_i + \beta_7\, dallbenefs_i + \beta_8\, dprivate_i + \varepsilon_i$

Where *lnS* is estimated as Salary per hour in models (A1) and (A2) and per month in models (B1) and (B2); *dteacher* is the dichotomous variable which takes the value of 1 if the individual *i* is a teacher, *exp* represents years of experience and *exp^2* is years of experience squared, and *dTC* and *dUC* are two dichotomous variables which indicate the level of education attained by the individual *i.* These two dummy variables were created to control for the correlation between income and education. These are: *dTertiaryComplete* and *dUniversityComplete*. *dTC* takes the value of 1 if the individual has completed tertiary education. It takes the value of zero in any other case. *dUC* takes the value of 1 if the individual has completed university or postgraduate education, and takes the value of zero in any other case. If both *dTC* and *dUC* for an individual *i* take the value of zero, this indicates that the individual *i* began but did not complete higher education, be this university or tertiary. Because over 88% of teachers completed higher education, we do not consider it necessary to include an interaction variable between the condition of being a teacher and having completed higher education.[13]

To control for non-wage compensations we include a dummy *dallbenefits* which takes the value of 1 if the individual *i* has a job which offers all three measured benefits: paid vacations, health care and a discount on retirement. In addition to these variables, we consider a dummy variable *dprivate* which indicates whether the individual works in the private sector, a dummy variable *d2occupations* to indicate if the individual holds more than one occupation, and *hourmon* to represent the total number of hours worked per month by the individual (both in the main occupation and other occupations).

[12] All regressions are robust. They were tested for heteroskedasticity with the Breusch Pagan Test and corrected for Heteroskedasticity with the White method. Additionally, all models were run with Weighted Least Squares and the results are reported in Methodological Appendix Tables 1 and 2. Although the significance of some of the coefficients vary, the direction of the relationship is maintained through all models.

[13] This is a clear improvement since 1996, year in which Razquin (2004) shows 71.5% of female teachers between the ages of 19 and 64 completed higher education. For comparative purposes, limiting our sample to female teachers between the ages of 20 and 65, we find that 89% of this subsample completed higher education. Descriptive statistics by gender are shown in Appendix Table 4.

Originally, one would expect fringe benefits to have a negative correlation with income, as an individual may be prone to relinquish monetary retribution in exchange for benefits they would otherwise have to pay for themselves (such as vacations, retirement and healthcare). However, in the 2013 data set, the correlation between *dallbenefits* and any measure of income considered (main occupation income per month, total income per month) results to be positive. This makes sense considering that the jobs that are more likely to offer these benefits are formal jobs that are also required by law to fulfil at least a certain level of income, or which may need to compete in the market for the most qualified workers.

Focusing back on our model, our coefficient of interest is β_1, the coefficient for *dteacher*, which represents the salary differential for teachers, controlling for all other included variables.

Both models (A) and (B) are estimated for the surveyed population restricted by age (20 to 65) and education (incomplete tertiary and above). All coefficients are shown in Table 5. The results vary. These models were later estimated for women and men separately to see if the impact of certain variables varied according to gender. All variables returned similar coefficients for both men and women, varying mostly in level of significance. The results are included in Table 6.

Hourly salary differential

Firstly, we run Models (A1) and (A2), estimating the salary differential for salary per hour on the whole restricted population, with a total of 7,064 valid observations in the regression. In both models (1) and (2), the coefficient for *dteacher* is positive and significant at the 0.001 level.

In Model (A1), teachers earn on average 28% more per hour than non-teachers do, controlling for education, years of experience and gender. This positive teacher differential is surprising, given public sentiment that teachers are not well paid. The sign of the coefficient may be due to the way in which salary per hour is calculated, as mentioned in the section above: if teachers misreport hours worked, this will blow up their salary per hour and cloud our estimations. The rest of the estimated coefficients result in accordance to expectations. There is a clear return to education as an individual with complete tertiary or university education earns an hourly salary on average 20% and 38% higher than an individual of similar characteristics with incomplete higher education (respectively). Also in

line with our expectations, the more amount of years of experience, the higher the income (almost 4% higher per additional year of experience, on average).

In Model (A2), when we incorporate more control variables into the model, the Teacher effect decreases to half its magnitude. Teachers earn, *ceteris paribus*, 12% more than non-teachers when we control for characteristics such as receiving work benefits, working in the private sector and having more than one occupation. The variable that seems to represent an important differential is *dallbenefits,* which has an estimated coefficient of 36%. This hints that an individual will earn on average 36% more than a counterpart of similar human capital traits, if s/he receives all three measured work benefits from their main occupation (with a level of significance of 0.001). The positive correlation between salary and receiving benefits such as paid vacations, healthcare and a discount in retirement may be linked to the fact that formal companies obliged by law to give those benefits also compete for employees in the labour market and thus pay higher salaries than informal jobs. Further investigation of this relationship exceeds the scope of this paper.

Finally, we also observe that having two occupations naturally increases hourly salary and working in the private sector has a negative correlation with salary – private employees earning on average 9% less than similar individuals working in the public sector.

Monthly salary differential

After estimating Model (A), Models (B1) and (B2) estimate the teacher salary differential using individuals' monthly salaries. These estimations vary widely in comparison to the estimations resulting from Model (A). In Model (B1), the generic Mincer variables take the expected values: the higher the level of education attained, the higher the salary earned; the more experience the higher the salary, with a deceleration of this impact in time (negative coefficient for experience squared). Male individuals earn 30% more than female individuals of similar characteristics (significantly different than zero). As for our main variable of interest, *dteacher*, the estimated coefficient is $\beta 1=0{,}0014$. This is to say that teachers earn monthly salaries 0,14% higher than non-teachers, but not significantly different than zero. We could conclude from this model that teachers earn salaries per month at the same level as non-teachers and therefore do not face a higher opportunity cost than workers in other professions. However, we run Model (B2), controlling for other observational differences, to make sure our conclusions are well founded.

In Model (B2), regressing the log of salary per month on our independent variables, controlling for gender, education, experience, work benefits, private sector employment, having more than one occupation and the amount of hours worked per month, our results indicate that teachers earn, on average, 13.5% less than non-teachers, significant at the 0.001 level. A statistically significant salary differential of -13.5% suggests that teachers do in fact face a larger opportunity cost than other workers of similar characteristics. Results are shown in Table 5.

The rest of the variables have similar coefficients to models (A1), (A2) and (B1), all significant at the 0.001 level. Private sector employees earn on average 8% less than their public sector counterparts. Individuals who have two occupations earn 10% more than those who do not. Individuals who receive all three benefits earn 65% more than individuals who do not receive these benefits. In the model estimating salary per month, we include hours worked per month to control for jobs that require less hours of work (such as teaching). This variable has, as expected, a positive and significant coefficient – however its impact is low. For every additional hour of work per month, the monthly salary increases in 0,3%.

Table 5: OLS Estimates of the Teacher Salary Differential for Hourly and Monthly Logged Salaries

	Model (A) Salary Per Hour		**Model (B) Salary Per Month**	
Variables	(A1)	(A2)	(B1)	(B2)
Intercept	2.905	2.837	7.215	6.698
	(.000)	(.000)	(.000)	(.000)
Teacher (D)	0.282	0.123	0.001	-0.135
	(.000)	(.000)	(.979)	(.000)
Male (D)	0.078	0.073	0.305	0.212
	(.000)	(.000)	(.000)	(.000)
Tertiary complete (D)	0.201	0.159	0.319	0.227
	(.000)	(.000)	(.000)	(.000)
University complete (D)	0.387	0.348	0.541	0.439
	(.000)	(.000)	(.000)	(.000)
Experience	0.037	0.028	0.076	0.055
	(.000)	(.000)	(.000)	(.000)
Experience2	-0.001	-0.0003	-0.001	-0.001
	(.000)	(.000)	(.000)	(.000)
2 Occupations (D)		0.087		0.247
		(.000)		(.000)
All benefits (D)		0.362		0.657
		(.000)		(.000)
Private Employee (D)		-0.091		-0.079
		(.000)		(.081)
Hourmon				0.003
				(.000)
No. of Obs.	7,064	6,990	7,368	7,280
R^2	13.05%	19.21%	10.86%	21.23%

Salary differential by gender

All four models were run for the female and male subpopulations separately. Our results, shown in Table 6, are consistent with our findings in the models run for the complete pooled sample.

Table 6: OLS Estimates of the Teacher Salary Differential for Hourly and Monthly Logged Salaries Separated by Gender

	Model (A) - Salary Per Hour				**Model (B) - Salary Per Month**			
	Women		Men		Women		Men	
Variables	(A1)	(A2)	(A1)	(A2)	(B1)	(B2)	(B1)	(B2)
Intercept	2.943	2.891	2.945	2.849	7.309	6.828	7.406	6.779
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Teacher (D)	0.269	0.113	0.311	0.141	0.029	-0.169	-0.079	-0.149
	(.000)	(.000)	(.000)	(.001)	(.477)	(.000)	(.190)	(.016)
Tertiary complete (D)	0.226	0.178	0.173	0.141	0.368	0.240	0.269	0.213
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
University complete (D)	0.403	0.354	0.374	0.342	0.591	0.439	0.491	0.439
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Experience	0.029	0.02	0.043	0.035	0.060	0.040	0.092	0.071
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Experience2	-0.0003	-0.0001	-0.001	-0.0005	-0.001	-0.001	-0.002	-0.001
	(.004)	(.202)	(.000)	(.000)	(.000)	(.002)	(.000)	(.000)
2 Occupations (D)		0.062		0.123		0.259		0.265
		(.034)		(.000)		(.000)		(.000)
All benefits (D)		0.379		0.346		0.761		0.554
		(.000)		(.000)		(.000)		(.000)
Private Employee (D)		-0.102		-0.074		-0.140		0.002
		(.000)		(.004)		(.058)		(.951)
Hourmon						0.003		0.003
						(.000)		(.000)
No. of Obs.	3,785	3,741	3,279	3,249	4,001	3,949	3,367	3,331
R^2	13.88%	20.36%	12.24%	18.07%	9.05%	21.22%	10.88%	19.71%

When analysing the hourly salary differential Model (A1), for both men and women the coefficient for *dteacher* is positive and significant at the 0.001 level. In Model (A2), the coefficients maintain their statistical significance but decrease in magnitude, from 0.31 to 0.14 in the male subsample, and from 0.27 to 0.11 in the female subsample. Our conclusions therefore continue to hold that when considering income per hour and controlling for occupational characteristics, teachers earn on average between 11% and 14% more than non-teacher equivalents. This positive salary differential is explained by the fact that teachers work fewer hours per month.

However, because we recognise that individuals seldom have the chance to choose the amount of hours worked per week, we look at the teacher salary differential for monthly salaries. Running Models (B1) and (B2) for men and women separately also result in coefficients similar to running the

models for the pooled sample. For model (B1), both the male and female teacher salary differential is not significantly different from zero.

The results are most interesting for Model (B2) and are summarized in Table 7. The female teacher salary differently for Model (B2) indicates that teachers earn 17% less than non-teachers per month on average, significant to the 0.001 level. Recalling Razquin's results, female teachers in 1996 earned salaries that were not significantly different from non-teacher salaries, when measured per month; in comparison, we can observe a detriment in teacher monthly salary differentials which could be studied further. This is consistent with CIPPEC (2014), which stated that teacher real salaries were favoured between 2003 and 2008, reaching a level 50% higher than in 1996, but from 2008 onwards became stagnant in real terms.

Estimating Model (B2) for the male population results in a negative teacher salary differential of -14.9%, but significant only at a 0.05 level. These results may lose significance in part due to the size of the sample: only 269 individuals from the male sample are teachers. Nonetheless, both (B2) resulting coefficients for *dteacher* in the male and the female sample indicate that teachers in fact do face lower salaries per month on average, holding all other variables constant.

Table 7: OLS Estimates of the Teacher Salary Differential in Model (B2) by Gender

	Model (B2) - Salary Per Month	
	Women	**Men**
Variables	(B2)	(B2)
Teacher (D) Coefficient	-0.169	-0.149
	(.000)	(.016)
No. of Obs.	3,949	3,331
R^2	21.22%	19.71%

In addition to Models (A) and (B), all models were run including variables *dmarried* and *dspouse*, dummy variables which indicate if the individual is married and if the individual is the spouse of the chief of household, respectively. These models were run to see if these individual characteristics had an impact on salary and were omitted variables. However, because their estimated coefficients were not significant across all models and did not make a difference on the coefficient for *dteacher*, they were excluded from the main models.

VI. Concluding Remarks

Reviewing our results, we observe that the estimates for the teacher salary differential considering salary per hour indicate that teachers earn more than non-teachers of similar characteristics. However, if we consider salary per month, teachers earn less than their non-teacher counterparts, *ceteris paribus*. There are various comments we can make on these results.

First of all, we return to how we created the variable salary per hour. This variable was created as total income per month divided by total hours worked per month. We know that teachers tend to work part time in schools and universities, and may not contemplate all the hours devoted to their primary occupation as they may only consider the hours spent teaching and not those planning lessons, correcting homework/tests, *et cetera*. This underestimation of the hours worked per month will inherently increase their salary per hour. This may explain in part why teacher salary differential per hour is positive. (Razquin, 2005).

Secondly, teacher salary differential per hour may not be representative of the average individual's opportunity cost. In reality, an individual does not have the liberty to choose how many hours to work per month or week. This point is also made in Allegretto's *How does teacher pay compare?* (Razquin, 2005). Usually, the way the labour market is shaped in Argentina today, an individual chooses an occupation which is tied to a salary per month and a given amount of hours of work per week. In this case, even if a potential teacher knows they will be earning more money per hour worked if they choose teaching over another occupation, they might want guarantee that they will be able to work more hours per month and earn more money. If we accept this to be the case, individuals choosing an occupation will consider salary per month and not salary per hour when calculating their opportunity cost.

With this in mind, if we take Model (B2) to be of most relevance in today's reality, we conclude that teachers earn salaries on average 13.5% lower than individuals of similar human capital characteristics working in other professions. This opportunity cost will be taken into account by potential teachers. Individuals who depend on their monthly salary, are responsible for their household's main income and/or prioritize income per month when choosing an occupation, may be discouraged from choosing to become a teacher. Individuals who choose to become a teacher regardless of the larger opportunity cost, may fit one of two situations. Either they do not give their

monthly salaries as much weight in their utility function, perhaps because working as a teacher in itself gives them utility, or they could not earn as much in other occupations (possibly individuals with fewer qualifications who, competing with better qualified workers, would not obtain the better paying positions). In conclusion, this opportunity cost embodied in a -13.5% teacher salary differential could be diminishing the quality and quantity of teacher recruitment that the educational institution in Argentina is capable of today.

Table 8: OLS Estimates of the Teacher Salary Differential for Hourly and Monthly logged Salaries, Pooled and by Gender in both Regressions 1 and 2

	Model (A) Salary Per Hour		**Model (B) Salary Per Month**	
Variables	(A1)	(A2)	(B1)	(B2)
Pooled Sample Teacher (D)	0.282	0.123	0.001	-0.135
	(.000)	(.000)	(.979)	(.000)
Men Teacher (D)	0.311	0.141	-0.079	-0.149
	(.000)	(.001)	(.190)	(.016)
Women Teacher (D)	0.269	0.113	0.029	-0.169
	(.000)	(.000)	(.477)	(.000)

From our findings we understand that teachers earn more or less than their non-teacher counterparts depending on the measure of salary that we consider. Further investigations regarding different salary differentials across regions of the country and a more empirical link between teacher salary differential and teacher quality exceed the scope of this paper.

References

APRENDER (2016). Recuperado en Octubre de 2016 de http://www.aprender.educ.ar/

Botinelli, L. E. (2015). El empleo docente en la Argentina. Tendencias en la posconvertibilidad (2003-2011) y aportes para su estudio a partir de la Encuesta Permanente de Hogares. Buenos Aires: Universidad Nacional de Tres de Febrero.

Caselli, F. & Morelli, M. (2002). Bad Politicians. *Journal of Public Economics 88* (2004) 759 – 782

Carnoy, M. (1995). Political Economy of Educational Production. *International Encyclopedia of Economics of Education,* Oxford: Elsevier Science.

CENPE. (2014). Censo Nacional del Personal de los Establecimientos Educativos. Dirección Nacional de Información y Estadística Educativa. Recuperado en Noviembre de 2016 de http://portales.educacion.gov.ar/diniece/censo-docente/

CIPPEC. Mezzadra, F. & Veleda, C. (2014). *Apostar a la docencia. Desafíos y posibilidades para la política educativa argentina.* Buenos Aires: Fundación CIPPEC.

CIPPEC. Mezzadra, F., Veleda, C. & Rivas, A. (2015). 10 propuestas para mejorar la educación en la Argentina. Buenos Aires: Fundación CIPPEC.

Gertel, H. R., De Santis, M., & Cristina, D. A. (2002). Who chooses to become a teacher in Argentina? Córdoba: Instituto de Economía y Finanzas.

De Santis, M. & Gertel, H. R., (2000). El salario de los maestros. Un modelo dinámico del comportamiento del Mercado de maestros, aplicado a Córdoba 1980-1997. Córdoba: Instituto de Economía y Finanzas.

Hanushek, E. A. (1995). Education Production Functions. *International Encyclopedia of Economics of Education,* Oxford: Elsevier Science

Hanushek, E. A. & Woessman, L. (2010). Education and Economic Growth. *International Encyclopedia of Education. volume 2*, pp. 245-252. Oxford: Elsevier

Herrero, V., De Santis, M., Gertel, H. R. (2003). El ingreso de los docentes en la Argentina: es alto o bajo? Córdoba: Instituto de Economía y Finanzas.

Herrero, V., De Santis, M., Gertel, H. R. (2004). Un examen empírico del empleo y la remuneración docente en las escuelas de Argentina en 1998 y 2002 aplicando ecuaciones de ingreso corregidas por selectividad. Córdoba: Instituto de Economía y Finanzas.

Instituto Nacional de Estadística y Censos (2013). Encuesta Permanente de Hogares de Argentina. Buenos Aires: Autor.

Morduchowicz, Alejandro. (2002). Carreras, incentivos y estructuras salariales docentes.

National Secretary of Economic Policy and Development. (2015). Gasto Público Consolidado. Retrieved November 2016 from http://www.economia.gob.ar/secretarias/politica-economica/programacion-macroeconomica/otras-publicaciones/

Ñopo, Hugo, Alejandra Mizala. (2015). Measuring the relative pay of school teachers in Latin America 1997-2007. *International Journal of Educational Development*.

Ñopo, Hugo, Alejandra Mizala. (2012). Evolution of Teachers' Salaries in Latin America at the Turn of the 20th Century: How Much Are They (Under or Over) Paid? Discussion Paper. Bonn, Germany: IZA

Ñopo, H. (2014, Febrero 14). *Y tú, ¿quieres que tus hijos sean docentes?* Recuperado en Junio de 2016 de http://blogs.iadb.org/educacion/es/2014/02/14/y-tu-quieres-que-tus-hijos-sean-docentes/

Ñopo, H. (2015, Junio 29). *La profesión docente: ¿por qué no atrae a los mejores?* Recuperado en Junio de 2016 de http://blogs.iadb.org/educacion/es/2015/06/29/la-profesion-docente-por-que-no-atrae-a-los-mejores/

OECD. (2014). *Resultados de PISA 2012 en Foco*. Recuperado en Noviembre de 2016 de https://www.oecd.org/pisa/keyfindings/PISA2012_Overview_ESP-FINAL.pdf

ONE. (2013). Informe Ejecutivo CENSO Operativo Nacional de Evaluación. Dirección Nacional de Información y Estadística Educativa. Recuperado en Noviembre de 2016 de http://portales.educacion.gov.ar/diniece/files/2015/04/INFORME-EJECUTIVO-CENSO-ONE-2013.pdf

Razquin, P. (2004). Teacher salary differentials in Argentina, Chile, and Uruguay: A comparative study. Santa Monica, CA: RAND Corporation.

Razquin, P. (2005). [Review of the book *How does teacher pay compare? Methodological challenges and answers* by S. A. Allegretto, S. P. Corcoran, & L. Mishel, (2004). Washington, D.C.: Economic Policy Institute.

Razquin, P. (2014). The Opportunity Costs of teaching: Variations in Urban Labor Markets and Changes in the Last Three Decades. CONICET.

Vázquez, L. (2016, 22 de Abril). El 18 de octubre se lanzará Aprender, el nuevo operativo nacional de evaluación educativa. *La Nación*. Recuperado en Noviembre 2016 de http://www.lanacion.com.ar/1892047-el-18-de-octubre-se-lanzara-aprender-el-nuevo-operativo-nacional-de-evaluacion-educativa

Vegas, E., Pritchett, L., & Experton, W. (1999). Attracting and retaining qualified teachers in Argentina: Impact of the structure and level of compensation. Washington, D.C.: The World Bank.

Ybarra, G. (2016, 13 de Abril). "Hoy, la mitad de los jóvenes no termina el colegio secundario", dijo Esteban Bullrich. *La Nación*. Recuperado en Noviembre de 2016 de http://www.lanacion.com.ar/1888789-hoy-la-mitad-de-los-jovenes-no-termina-el-colegio-secundario-dijo-esteban-bullrich

Appendix

Table 1: Definition of variables created and used in the analysis

Variable	Definition
lnph	Natural Log of Individual's Total Income per Month *(p47t)* divided by total hours worked per month *(hourmon)*
lnpt	Natural Log of Individual's Total Income per Month *(p47t)*
hourmon	Hours worked per month in all occupations (main and additional). *hourmon=pp3e_tot+pp3f_tot*
dteacher	Dichotomous variable which takes the value of 1 if the individual is a teacher. Response to Branch of Economic Activity and Main Occupation fall under the teaching category. *pp4b_caes=8501 or 8509* and *pp4d_cod=43.1.11 through 43.1.14.*
dmale	Dichotomous variable which takes the value of 1 if the individual is male. *ch04=1*
exp	Years of potential work experience, calculated as: Age-Years of schooling-5. 5 is the age at which children enter kindergarten in Argentina. *exp=ch06-yearsofschooling-5*
exp^2	Years of potential work experience, squared.
crossEd	Interaction between *nivel_ed* and *ch12* to determine which level of education each individual attained and whether or not that level was completed. Interaction details can be found in Appendix Table 2.
Years of Schooling	Calculation of the years taken to attain the level of education declared. Conversion can be found in Appendix Table 3.
dprivate	Dichotomous variable which takes the value of 1 if the individual is employed in the private sector, 0 otherwise. *pp04a=2*
dallbenefs	Dichotomous variable which takes the value of 1 if the individual receives the following three benefits from their main occupation (paid vacations, health care and a discount in retirement), 0 otherwise. *pp07g1=1 pp07g4=1* and *pp07h=1*
d2occup	Dichotomous variable which takes the value of 1 if the individual has an additional occupation. *pp03c=2*
dmarried	Dichotomous variable which takes the value of 1 if the individual is married or in a partnership, 0 otherwise. *ch07=1* or *ch07=2*
dspouse	Dichotomous variable which takes the value of 1 if the individual is the spouse of the chief of HH, 0 otherwise. *ch03=2*
Income Base	Calculated as Total Family Income minus Total Individual Income. The higher the income base, the lower the household need for the individual's income. *incbase=itf-p47t*

Table 2: Generation of variable CrossED as an interaction of Level of Education Attained (*nivel_ed*) and Educational Facility Attended (*ch12*)

Defining *crossED* Level of Education	***nivel_ed***						
ch12	Incomplete Elementary (1)	Complete Elementary (2)	Incomplete Secondary School (3)	Complete Secondary School (4)	Incomplete Higher Education (5)	Complete Higher Education (6)	No instruction (7)
No Instruction (0)							No instruction
Kindergarten/Preschool (1)							Preschool
Elementary (2)	Incomplete Primary	Complete Elementary					
Elementary (EGB) (3)			Incomplete Secondary				
Secondary (4)				Complete Secondary			
High School (Polimodal) (5)							
Tertiary (6)					Incomplete Tertiary	Complete Tertiary	
Graduate University (7)					Incomplete University	Complete University	
Postgraduate (8)							
Special Education (9)	Incomplete Primary						
N/R (99)		Complete Elementary	Incomplete Secondary	Complete Secondary	Incomplete Tertiary		No instruction

Table 3: Conversion of Level of Education to Years of Schooling

Level of Education *(crossED)*	Years of Schooling
Preschool/No instruction	0
Incomplete Elementary	0
Complete Elementary	7
Incomplete Secondary	7
Complete Secondary	12
Incomplete Tertiary	12
Incomplete University	12
Complete Tertiary	15
Complete University	16

Table 4: Descriptive Statistics for Demographic variables in the sample population by gender

	Women			Men		
Variables	Teachers	Non-Teachers	Difference	Teachers	Non-Teachers	Difference
Age	41	38	3	41	39	2
Standard Deviation	10	11	-2	10	11	-1
Min	20	20	0	22	20	2
Max	64	64	0	63	64	-1
Education (%)						
Tertiary Incomplete	3%	14%	-10.5 pp	4%	12%	-8.1 pp
Tertiary Complete	62%	25%	37.6 pp	43%	20%	22.7 pp
University Incomplete	7%	26%	-18.9 pp	14%	35%	-20.7 pp
University Complere	27%	35%	-8.2 pp	39%	33%	6.1 pp
Relation to Chief of HH (%)						
Chief	28%	31%	-3.2 pp	75%	68%	7.0 pp
Partner	52%	41%	11.3 pp	6%	7%	-0.6 pp
Martial Status (%)						
Married	64%	52%	12.3 pp	64%	63%	0.1 pp
Single	23%	36%	-12.6 pp	29%	31%	-1.7 pp
Total number of cases	**954**	**3,047**		**269**	**3,098**	

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

Table 5: Descriptive Statistics for Income and Occupational variables in the sample population by gender

	Women			Men		
Variables	Teachers	Non-Teachers	Difference	Teachers	Non-Teachers	Difference
Years of Work Experience	21	19	2	21	20	1
Standard Deviation	9	11	-1	10	11	-1
Private employee	74%	34%	39.8 pp	81%	27%	53.7 pp
Two occupations (%)	25%	11%	14.3 pp	33%	10%	23.5 pp
Benefits						
Paid Vacations	96%	63%	33.1 pp	96%	64%	32.5 pp
Health Care	97%	63%	33.4 pp	97%	64%	32.9 pp
Retirement	97%	62%	34.9 pp	96%	63%	32.9 pp
All benefits	96%	61%	35.1 pp	95%	63%	32.2 pp
Income						
Main Occupation Income per Hour	$55	$40	$14	$59	$45	$14
Standard Deviation	$33	$31	$2	$28	$43	-$15
% missing	11.0%	3.6%		6.3%	2.3%	
Total Income per Hour	$57	$44	$13	$63	$48	$15
Standard Deviation	$43	$41	$2	$36	$54	-$18
% missing	11.0%	3.6%		6.7%	2.3%	
Main Occupation Income per Month	$4,859	$5,295	-$436	$5,903	$7,128	-$1,225
Standard Deviation	$2,428	$3,911	-$1,484	$3,406	$5,225	-$1,818
Total Income per Month	$5,978	$5,941	$37	$7,445	$7,752	-$308
Standard Deviation	$3,551	$4,366	-$815	$4,008	$5,825	-$1,817
Total Family Income	$13,109	$12,958	$151	$12,734	$13,685	-$951
Standard Deviation	$7,088	$8,562	-$1,474	$6,881	$8,636	-$1,755
Income Base	$7,131	$7,017	$114	$5,289	$5,933	-$644
Standard Deviation	$6,108	$6,771	-$663	$5,186	$6,155	-$969
Hours per month	101	141	-40	119	173	-54
Standard Deviation	54	62	-7	61	65	-4
% missing		0.23%		0.37%	0.16%	
Hours per week Main Occupation	21	34	-12	25	41	-17
Standard Deviation	12	15	-3	13	16	-2
% missing		0.20%			0.13%	
Hours per week Other Occupations	4	2	2	5	2	3
Standard Deviation	7	5	2	9	6	3
% missing		0.03%		0.37%	0.03%	
Total number of cases	**954**	**3,047**		**269**	**3,098**	

Source: Elaborated with data from INDEC (EPH 4th trimester 2013)

Methodological Appendix

All models run for this analysis were estimated with Ordinary Least Squares (OLS) corrected for heteroskedasticity with the White method. In this appendix, I present the results for the same model equations run with Weighted Least Squares (WLS) for further robustness checks. The weight utilized was the variable “pondera”, included in the EPH. The results are shown in the tables below. The OLS method was chosen for the presentation of the paper because it does not require assumptions to be made about the variance of the sample and because it prioritises unbiased results. WLS, on the other hand, results in unbiased and more efficient coefficients than OLS, but requires assumptions to be made when choosing the variance of the sample.

As can be seen in Tables 1 and 2 of this methodological appendix, the estimations of the coefficients maintain the sign of the original OLS results. Teacher salary differentials are positive when measured per hour, ranging from 24% to 9% between Model (A1) and Model (A2), not significantly different from zero in Model (B1) and negative and significant in Model (B2). Estimated controlling for all independent variables, the monthly teacher salary differential indicates that teachers earn, on average, 17% less than non-teachers of similar characteristics. This coefficient is significant at the 0.05 level. Table 1 illustrates all coefficient results for Models (A) and (B) estimated for the entire subsample.

As in the OLS analysis, all four models were run for women and men separately. The results are shown in Table 2. Similarly, coefficients for *dteacher* when estimating salary per hour result positive and significant. Coefficients for *dteacher* when estimating salary per month result in significant and negative salary differentials when controlling for all independent variables (Model B2).

Methodological Appendix Table 1: WLS Estimates of the Teacher Salary Differential for Hourly and Monthly Logged Salaries

	Model (A) Salary Per Hour		**Model (B) Salary Per Month**	
Variables	(A1)	(A2)	(B1)	(B2)
Intercept	3.027	3.017	7.334	6.901
	(.000)	(.000)	(.000)	(.000)
Teacher (D)	0.248	0.094	0.017	-0.159
	(.000)	(.006)	(.764)	(.013)
Male (D)	0.063	0.065	0.284	0.202
	(.021)	(.015)	(.000)	(.000)
Tertiary complete (D)	0.161	0.134	0.309	0.238
	(.000)	(.000)	(.000)	(.000)
University complete (D)	0.367	0.335	0.505	0.434
	(.000)	(.000)	(.000)	(.000)
Experience	0.034	0.026	0.071	0.054
	(.000)	(.000)	(.000)	(.000)
Experience2	-0.001	-0.0003	-0.001	-0.001
	(.000)	(.008)	(.000)	(.000)
2 Occupations (D)		0.12		0.261
		(.000)		(.000)
All benefits (D)		0.285		0.538
		(.000)		(.000)
Private Employee (D)		-0.138		-0.189
		(.000)		(.039)
Hourmon				0.003
				(.000)
No. of Obs.	7,064	6,990	7,368	7,280
R^2	10.26%	15.13%	8.34%	16.87%

Methodological Appendix Table 2: WLS Estimates of the Teacher Salary Differential for Hourly and Monthly Logged Salaries by Gender

	Model (A) - Salary Per Hour				**Model (B) - Salary Per Month**			
	Women		Men		Women		Men	
Variables	(A1)	(A2)	(A1)	(A2)	(B1)	(B2)	(B1)	(B2)
Intercept	3.139	3.134	2.973	2.968	7.564	7.118	7.369	6.901
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Teacher (D)	0.247	0.114	0.261	0.058	0.017	-0.153	0.106	-0.249
	(.000)	(.006)	(.000)	(.283)	(.811)	(.066)	(.176)	(.010)
Tertiary complete (D)	0.196	0.161	0.125	0.105	0.363	0.251	0.247	0.214
	(.000)	(.001)	(.018)	(.044)	(.000)	(.002)	(.002)	(.006)
University complete (D)	0.388	0.349	0.347	0.321	0.536	0.411	0.476	0.449
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Experience	0.018	0.009	0.049	0.042	0.042	0.024	0.102	0.086
	(.005)	(.105)	(.000)	(.000)	(.000)	(.008)	(.000)	(.000)
Experience2	-0.0001	0	-0.001	-0.0007	-0.001	-0.0002	-0.002	-0.002
	(.305)	(.844)	(.000)	(.001)	(.004)	(.235)	(.000)	(.000)
2 Occupations (D)		0.08		0.174		0.235		0.323
		(.000)		(.000)		(.000)		(.000)
All benefits (D)		0.284		0.284		0.633		0.439
		(.000)		(.000)		(.000)		(.000)
Private Employee (D)		-0.124		-0.16		-0.257		-0.100
		(.000)		(.000)		(.074)		(.069)
Hourmon						0.003		0.002
						(.000)		(.012)
No. of Obs.	3,785	3,741	3,279	3,249	4,001	3,949	3,367	3,331
R^2	10.86%	15.79%	10.29%	15.23%	6.28%	18.65%	9,37%	14.86%