The coexistence of Degree-Premium and High-Dropout Rates in the Uruguayan Secondary Education: an Incentives Problem

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Abstract

Although participation rates in the educational system might look impressive for a Latin American country, educational outputs are not that great. Uruguay is characterized by educational gaps and high drop-out rates in the secondary education. In our work we first explore the returns to schooling in Uruguay. In the course of our analysis, we use quantile regression models that are more suitable than ordinary least squares (OLS) for countries where heterogeneity within the labour force in terms of earnings and the impact of individual characteristics on earnings is significant. In particular we test the hypothesis of the existence of a degree premium for those individuals that complete the secondary education (12 years of education). As we find evidence that allows us to confirm the existence of the degree premium, we make conjectures and present a possible explanation that links the evidence between the existence of degree premium, educational gaps and dropouts. The rationale is that since only the completion of the secondary degree will generate a clear economic benefit, many individuals will exit the educational system as they find difficulties in the transit along the secondary level. In other words, the completion of the entire secondary stage might be seen as a long haul race and Uruguayan youngsters end up exiting the process when they are still far from the end. To cope with the estimation problem of unobservable household or children characteristics, this investigation employs an instrumental variable (IV) strategy both for two-stage least squares (TSLS) and quantile regression (QTE).

JEL: I21, J31

Keywords: returns to schooling; education; instrumental variables; quantile regression

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I. Introduction

Uruguay's adult literacy rate is among the highest in Latin America, a result of the population's expanded access to education. Primary education in Uruguay is free and compulsory; it includes six years of instruction. General education in secondary schools encompasses six years of instruction divided into two three-year cycles. The first, or basic, cycle was compulsory (Junior High School); the second cycle was geared to university preparation (Completed High School). In addition to the academic track, public technical education schools provided secondary school education that was technical and vocational in nature. The two systems are parallel in structure, and there is little provision for transfer between the two. All sectors of society traditionally tend to prefer the academic course of study, which was regarded as more prestigious. As a result, academic secondary education had expanded more rapidly than technical education.

Educational coverage in Uruguay is extensive. In 2007, more than 99 percent of children between 6 and 11 years old attended primary school. Also, 85 percent of teenagers of age between 12 and 17 years old attended classes in an educative institution that year. A vast majority of Uruguayan children and youngsters attend public institutions. While 87 percent of the children in the primary system attend public schools; 85 percent of the individuals in the secondary levels are enrolled in public institutions.

Although participation rates in the educational system might look impressive for a Latin American country, educational outputs are not that great. Uruguay is characterized by educational gaps and high drop-out rates in the secondary education. Dropout levels are as high as 27 percent in rural areas and 13 percent among urban population. Additionally, among the adolescents aged between 12-17 years, 21 percent of the individuals show some educational gap. Finally, in the case of youngsters who live in poor households, 53 percent of them have an educational gap or have abandoned formal education (and this figure is even higher in the case of male youngsters).

As we explore the output of the Uruguayan secondary education, we observe high rates of educational gaps and dropout levels. Additionally, we find evidence that shows that poor educational results are concentrated among the poor. Naturally, these observations might have profound poverty and inequality implications for the future. Our interest is to analyze the possible link between the existence of degree premium in Uruguay, educational gaps and high dropout levels in the secondary level. We aim to evaluate if educational gaps and dropouts might be explained as an incentive problem. The rationale is that since only the completion of the secondary degree will generate a clear economic benefit, many individuals will exit the educational system as

they find difficulties in the transit along the secondary level. In other words, the completion of the entire secondary stage might be seen as a long haul race and Uruguayan youngsters end up exiting the process when they are still far from the end.

In our work we first explore the returns to schooling in Uruguay. In the course of our analysis, we use quantile regression models that are more suitable than ordinary least squares (OLS) for countries where heterogeneity within the labour force in terms of earnings and the impact of individual characteristics on earnings is significant. In particular we test the hypothesis of the existence of a degree premium for those individuals that complete the secondary education (12 years of education), compared to those who only finished primary school or junior high school. As we find evidence that allows us to confirm the existence of the degree premium, we make conjectures and present a possible explanation that links the evidence between the existence of degree premium, educational gaps and dropouts.

In the returns of schooling literature, a common issue is the presence of endogeneity due to the possible biased caused by measurement error and children or household unobserved characteristics. Heckman and Vytlacil (2001) consider the problems that arise in determining the role of cognitive ability in explaining the level of and change in the rate of return to schooling: one of these problems is that ability and schooling are so strongly dependent that it could be not possible, over a wide range of variation in schooling and ability, to independently vary these two variables and estimate their separate impacts.

To deal with the problem of possible endogeneity, we follow two strategies. Firstly, we instrumented personal education of each employee by the mean of accumulated years of education by age and locality of residence, and applied TSLS. Secondly, we estimated the quantile regression using the instrumental variables estimator of Abadie, Angrist and Imbens (2002) and following its implementation developed by Frölich and Melly (2008). Abadie, Angrist, and Imbens (2002) apply their IV estimator for QTE to estimate the effect of a publicly-funded training program. Their QTE estimator captures the effect of an intervention on distribution for individuals whose treatment status is changed by a binary instrument: thus, QTE estimator could be useful to test the impact of reaching a level of education, for instance.

II. Data

We use data from the Continuous Household Survey ("Encuesta Continua de Hogares") of 2006 and 2007, which is representative of the entire country (both rural and urban areas). This cross-section data is provided by the National Institute of Statistics ("Instituto Nacional de Estadística") of Uruguay, a public institution. We analyzed 58,318 observations corresponding to private and public paid workers (excluding workers in temporary public programs) in the rank of age [21,44]: 60 percent

from 2006 and 40 percent from 2007. The sample includes only those who work more than 10 hours a week in their main job (within the sample, about 11 percent has more than one job).

[Insert Graph 1]

Graph 1 shows the distribution of the accumulated years of education of each worker at the time of the survey. We are able to observe that the majority of these employees have only reach primary school (six years of education). The following two education categories which accumulate most observations are Junior High School (nine years of education) and Completed High School (twelve years of education).

[Insert Graph 2]

About ten percent of the population of Uruguay lives in illegitimate terrains in the surroundings of several cities (illegitimate means that these residents did not buy nor rent the terrains; they just occupied the land). Since 1990's this is a growing reality in this country, and in the early 2000 it underwent a rapid increase due to the severe economic crisis. Continuous Household Survey of 2006 and 2007 includes this particular subpopulation for the first time in Uruguay. Graph 2 shows the education distribution specifically of the workers who live in these illegitimate lands: approximately half of this subgroup has only reached primary education and, in average, each worker has fewer years of formal education in comparison with the entire sample (Graph 1).

[Insert Graph 3]

Separating the population in quintiles of poverty, we can observe in Graph 3 the great differences between the first and final quintile. Nearly 40 percent of deprived workers only achieve to complete primary school, while among the wealthy only less than 5 percent interrupted their education after completing primary school. In fact, the majority of these privileged employees completed (or are near to complete) their undergraduate or graduate degree in the university (16 accumulated years of education or more) and next to 20 percent has accomplished to conclude High School.

[Insert Graph 4]

Graph 4 illustrates us about the gender differences. Among the public and private paid workers aged [21, 44], each women has in average more completed years of education. For instance, if an undergraduate degree at university demands 4 years in average (thus 16 years of education in total), Graph 4 shows that while nearly 10 percent of women has reached 4 years of education at university, only 3 percent of men did.

[Insert Graph 5]

In Graph 5, the population is divided into ten quantiles of education. The wage per hour of the worker is plotted as a function of her/his accumulated years of education. For each group, the line in the middle of box represents the median of the data. The box extends from the 25^{th} percentile to the 75^{th} percentile (i.e. the interquartile range). The lines emerging from the box –the whiskers- extend to the upper and lower adjacent values which are a proportion of the interquartile range. The boxplots provide a summary of the distribution of the wage per hour for ten groupings of education. There is a tendency to rise in the wage per hour with accumulated years of education. Also, we could detect other feature from the plot: there is a tendency for dispersion, as measured by the interquartile range, to increase with education.

[Insert Table 1]

As we could observe in Table 1, comparing workers who accomplished only to end primary school with those who put an end to their education at a Junior High School level, the latter have greater access to internet at their homes, have less informal (i.e. out of the legal requirements) jobs, a greater proportion has public jobs, and a smaller number of them are married and have children. A shared feature of these two groups is the great proportion of them that attended public primary school. Also, those who finished Junior High School, maintain this tendency in secondary school.

[Insert Table 2]

Table 2 makes comparisons between two groups: those who achieved to complete High School and those who afford to complete undergraduate level in the university (or similar: professorship for primary and secondary school, etc.). The latter have greater access to internet at home, are less employed in informal jobs, a greater proportion are married though a smaller number have children, work usually fewer hours a week in their principal job but they have a greater quantity of jobs, and attended public education in an smaller proportion. To sum up, considering both tables 1 and 2, we observe that the most

significant features are that greater education in paid workers aged [21,44] is correlated with larger years working in the same job, less legal informality, greater probability to work in the public sector and more jobs at the same time.

III. Methodology

Following the bulk of the literature, we estimate Mincer equations. The model takes the following form:

$$\log w_i = \alpha + \beta Pi + \delta Hi + \gamma Si + \varepsilon, \quad (1)$$

where w_i is the real wage per hour; Pi is a subset of Personal variables; Hi is a group of Household variables, Si indicates years of schooling (the variable of interest) and ε is the error term.

The Mincer equation is first estimated using two stage least squares (TSLS), which focuses on mean effects. In addition, we also perform quantile regression (Koenker and Bassett, 1978) to study the effects of covariates on earnings at different points of the conditional distribution.

The regressions control for the traditional individual characteristics (age, gender and marital status), indications of employment characteristics (formal sector, public sector) and a set of socioeconomic variables. Among the control variables, we introduce four regional dummies (south, north, frontier, rural) considering the different economic development (and opportunities) by region. These dummies intend to collect the effect of worker's present residence comparative to the capital city (Montevideo, where half population of the country live).

We are interested in the impact on the outcome which is the wage rate. A significant amount of workers (about 11 percent of the sample) has more than one job, but we take into account only what the employee declares as his main job. We add all the earnings from this job: salary, incentives, gratuities, extra hours, travel allowances, meals at the firm, food, housing, health facilities (if they are greater than those mandatory by law), and other amenities as payments. We compute wages by hour in constant pesos and express them in logarithm. In order to avoid possible distortions, we drop workers who received payments for unemployment or compensations for illness in the previous month, maternity and accidents, or scholarships, and those who have been working for only two months (it is possible that they have not received their first salary yet).

In the returns to schooling literature, a common issue is the presence of endogeneity due to the possible biased caused by measurement error and children or household unobserved characteristics (take for instance, the ability of each person which could be influencing both educational outcomes and wages: this may lead to incorrect inferences about the causal relation between education and earnings). Heckman and Vytlacil (2001) consider the problems that arise in determining the role of cognitive ability in explaining the level of and change in the rate of return to schooling: one of these problems is that ability and schooling are so strongly dependent that it could be not possible, over a wide range of variation in schooling and ability, to independently vary these two variables and estimate their separate impacts.

To deal with the problem of possible endogeneity, we follow two strategies. Firstly, we instrumented personal education of each employee by the mean of accumulated years of education by age and locality of residence, and applied TSLS. There are 197 localities and people with 24 different ages. Thus, within the restrictions of available cross-section data, the identification of the IV estimates is based on the interaction of age and locality: exploiting the locality specific variation in education across ages we seek to control for unobserved characteristics that might be correlated with the wage and personal education. In the section of results, tables show the first stage of estimates: the instrumental variable is highly correlated with personal education. Berlinsky, Galiani and Manacorda (2008) employ a similar strategy to analyse the impact of preschool exposure on children subsequent academic achievements. They instrumented preschool attendance by the average preschool attendance in the child's cohort in his locality of residence.

Secondly, we estimated the impact of levels of education (Junior High School versus Primary School; and Completed High School versus Junior High School) using the quantile regression (regression quantiles provide an approach to characterizing the effect of schooling in different percentiles of the conditional wage distribution) with the instrumental variables estimator of Abadie, Angrist and Imbens (2002) and following its implementation developed by Frölich and Melly (2008). In the "Junior vs. Primary" estimation, we concentrate in the subsample of workers whose last educational level achieved is Junior High School and those who last educational level achieved is Primary School. The treatment is "Junior" (a dummy variable that takes value 1 if the last level of education achieved by a worker is Junior High School, and 0 if he only finished Primary School). We instrumented the treatment by a dummy variable which takes the value 1 if the mean of "Junior" at worker's locality for his age is greater or equal to 0.5, and 0 otherwise. We employ an analogous strategy for the "Completed High vs. Junior High" estimation. Exploiting the locality specific variation in the education level across ages we seek to control for unobserved characteristics that might be correlated with the wage and education level achieved. Below, tables with the first stage of estimates show that the instrumental variable is highly correlated with level of education achieved by each worker. And we

could argue that the mean education level by age and locality is not correlated with the unobserved characteristic (i.e. personal ability).

IV. Results

In Table 3, the observations are split into two age groups taking into account the possible existence of the life cycle effect on wages. An additional year of education makes salaries grow by about 20 percent for women. The effect is similar in the case of men in the range of age [31, 44], and the impact on the wage per hour for men among 21 and 30 years old seems to be lower: about 15 percent. These findings are in general analogous with the ones observed by Sanroman (2006) who restricted her analysis to male workers aged 35-44 and resident in the capital of Uruguay[3] . Another feature from Table 3 is the greater return for females (a possible explanation could be a possible bias: women demands larger return to schooling or they do not enter the labour market and remain at home because of household's demands: children, housekeeping, etc.). This result is consistent with the findings of Dougherty (2003) who shows that the rate of return to schooling appears to be nearly two percentage points greater for females than for males in the National Longitudinal Survey of Youth data set (a panel study managed by the Centre for Human Resource Research at the Ohio State University) despite the fact that females tend to earn less, both absolutely and controlling for personal characteristics. Dougherty summarized previous studies reporting wage equations which reveal that a higher return to female schooling appears to be the norm and considers various explanations. One possibility is that part of the differential could be attributable to male-female differences in the quality of educational attainment. Another explanation considered is that women choose to work in sectors where education is relatively highly valued.

[Insert Table 3]

[Insert Appendix of Table 3]

It may be useful to repeat this analysis in a social vulnerable subsample: the poor. In order to study the impact of education among the poor, we have built an index of relative wealth using the goods information of the Continuous Household Survey which provides information about goods in the household such as: hot water heater, electric tea kettle, refrigerator, colour

[3] Sanroman (2006) analyses returns to schooling in Uruguay and restricts her investigation for male head of household aged [35-44] who are private paid workers. She focuses on the effect of an additional year of education but does not study the impact of accomplishing different completed levels of schooling. Instrumental variables are used to estimate mean and quantile regressions. She uses an indicator of internet available at home as an instrument for the years of schooling. She finds that, on average, each additional year of education correlates to an additional 22 percent in earnings.

television, cable TV service, washing machine, dishwasher, microwave, computer, internet connection, automobile for personal use, phone service, etc. For each good i, we have constructed a dummy variable d_i which takes value 1 if the house has this good or service, and 0 otherwise. Thus, we have developed this indicator in two steps:

First: we calculate the sample mean of each d_i;

Second: we estimate a relative wealth index:

$$\text{“}relative\ wealth\ index\text{”} = \frac{\sum_{i=1}^{i=13} [1 - mean(d_i)]\, d_i}{\sum_{i=1}^{i=13} [1 - mean(d_i)]} \tag{2}$$

therefore, as an indicator of relative welfare, the formula above shows that greater average of people in the sample having a particular good implies less relative welfare.

Thus, table 4 shows us that if the sample is restricted to those who are classified as poor (people in the worst quintile of relative wealth distribution), the returns to additional education are lower than in the entire population. Another attribute of the poor seem to be the fact that the returns for female are greater than for men.

[Insert Table 4]

[Insert Appendix of Table 4]

Moving our attention towards the impact on earnings of finishing Junior High School versus concluding only Primary School, we observe in Table 5 that the returns for women are no significantly different from zero in the majority of the age ranges. The TSLS results show us that these returns are null in the younger male cohort and grow with age.

[Insert Table 5]

[Insert Appendix of Table 5]

Finally, in order to evaluate the effect on wages of other two different levels of education -Junior High School versus Completed High School- Table 6 show us that Completed High School appears to have an important impact on earnings:

accomplish this educational level could mean an increase of more than 40 percent in the earnings of the younger cohort and in the long run might increase twofold a worker wage per hour.

[Insert Table 6]

[Insert Appendix of Table 6]

In the presence of endogeneity, the quantile regression estimator will be biased due to the possible presence of unobserved characteristics or measurements error. Thus, following Abadie, Angrist and Imbens (2002) and the implementation developed by Frölich and Melly (2008), we use an instrumental variable identification strategy to cope with endogeneity and improve our estimations, which are represented below. In the graphs below, we observe that in no case the impact of concluding Junior High School has a significantly different from zero effect on women earnings in any of the quantiles of the distribution, and the result is similar for men except some impact on men aged [26, 35].

[Insert Graphs of Impact on Women]

[Insert Graphs of Impact on Men]

It may be useful to repeat this analysis for a social vulnerable subpopulation: the poor. Thus, table 7 shows that the impact on them is not significant from 0 in most quantiles.

[Insert Table 7]

Finally, in Table 8 we confirm that Completed High School seems to have an important impact on earnings for both women and men. In contrast to the IV QTE of Junior High School, the IV QTE estimates both for men and women show significant effects of Completed High School almost at every quantile, with the largest effects at high quantiles and elevated range of age. For example, Completed High School is estimated to have raised the .25 quantile of earnings for women aged [26-30] by 41.8 percent, and this school level is estimated to increased twofold the .90 quantile of earnings for women aged [41-44]. The estimates support the notion that the Completed High School had a bigger impact on the upper tail of the distribution. Thus, we can see evidence of heterogeneity in returns.

[Insert Table 8]

V. Conclusions

Although participation rates in the Uruguayan educational system might look impressive for a Latin American country, educational outputs are not that great. Uruguay is characterized by educational gaps and high drop-out rates in the secondary education. In our work we explore the link between the existence of degree premium (for those who finish the secondary schooling) and dropouts. Our hypothesis lays in the idea that secondary schooling in Uruguay might be a very long haul race for many. Uruguayan youngsters only obtain meagre economic benefits as they make progress along the secondary schools. Only in the case that they complete the degree, they will obtain a significant reward in terms of their future wages.

In our work we first explore the returns to schooling in Uruguay. In the applied microeconometrics literature on education, a common issue is the presence of endogeneity because of household or children unobservable characteristics and the possibility of measurement errors. To cope with this problem, we follow an instrumental variable strategy in to ways: two-stages least squares (TSLS) and quantile regression with instrumental variables. These two approaches are complementary: while TSLS provides a "mean" estimation of the effect of education on earnings, regression quantiles provide an approach to characterizing the effect of schooling in different percentiles of the conditional wage distribution.

Obtained results allow us to compare the wage effect of completing additional levels of education. In particular, we focus in the effect of completing only primary school against the impact of Junior High School and results suggest that achieving Junior High School (9 years of education) versus Primary Education (6 years of education) has nearly no effect on earnings of the private and public female paid workers aged [21 - 44]. However, if we compare Completed High School (12 years of education) with Junior High School, the former has a significant and important positive impact on earnings that could double a worker's wage per hour.

In particular we test the hypothesis of the existence of a degree premium for those individuals that complete the secondary education (12 years of education). As we find evidence that allows us to confirm the existence of the degree premium, we make conjectures and present a possible explanation that links the evidence between the existence of degree premium, educational gaps and dropouts. The rationale is that since only the completion of the secondary degree will generate a clear economic benefit, many individuals will exit the educational system as they find difficulties in the transit along the secondary level. A possible explanation for the degree premium is related to the fact that in Uruguay, obtaining a secondary school degree is

almost equivalent to obtaining a minimum requirement for obtaining a permanent job in the formal labour market. In our opinion, obtained results suggest the same phenomena: only those who complete the secondary level obtain positive impact on their wage rates. Those who will probably be unable to make it up to the final, will probably not receive major reward in terms of their future wage. In other words, the completion of the entire secondary stage might be seen as a long haul race and Uruguayan youngsters end up exiting the process when they are still far from the end.

What could we deduce from these results? These outcomes tell us that a child who has just concluded primary school finds no premium in starting and concluding Junior High School. Thus, he receives an incentive not to conclude this level nor perform very well in her first years of secondary school. Notwithstanding that one could argue that the child could be instead encouraged by the fact that if he finishes Complete High School he could even increase twofold his future wage per hour, this future is too far off: after concluding Primary School he ought to study another six years to accomplish a "premium" wage. Hence a line of policy recommendation could be to reformulate education in order to find and build short and medium run incentives. Other complementary lines of policy might be to strengthen social networks such as: families (Heckman, 2008); parents' involvement and participation in the school of their children; schools with extended hours of classes; etc. All this could help to support and sustain the child effort to study when he is in the "short run". Exploring these lines of policy action is crucial especially for the poor (the impact of finishing Junior High School vs. Primary School is also nearly null for this vulnerable subpopulation): study -after completing primary school- extra six years without short run incentives could be very difficult because poverty in Uruguay expels children from the education system to the informal labour market.

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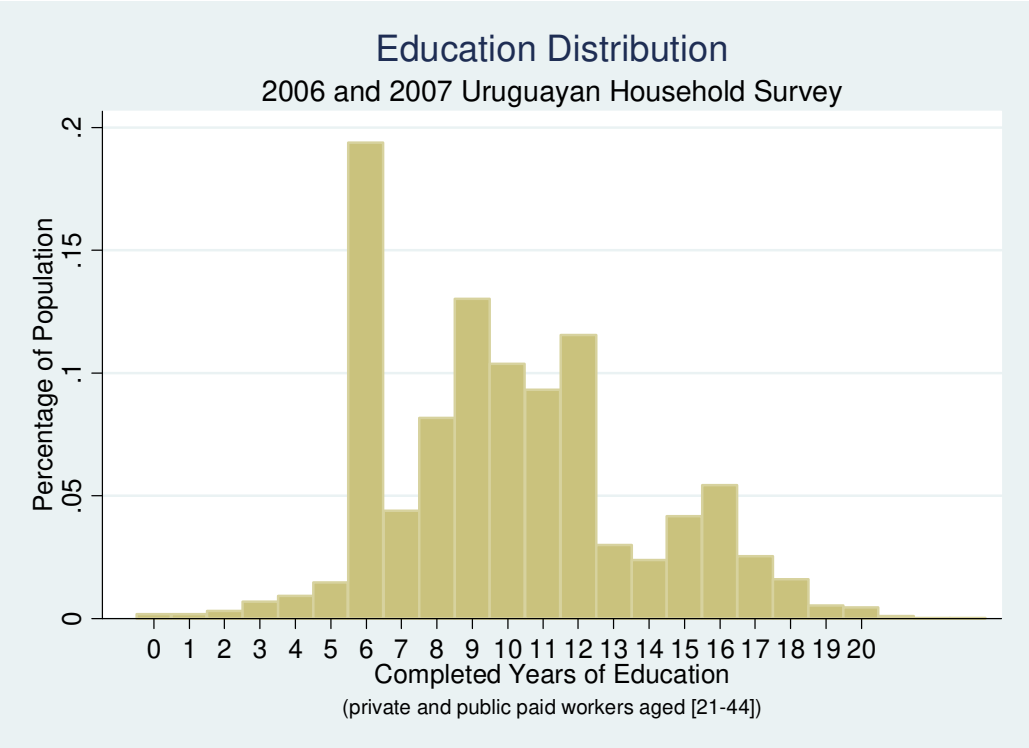
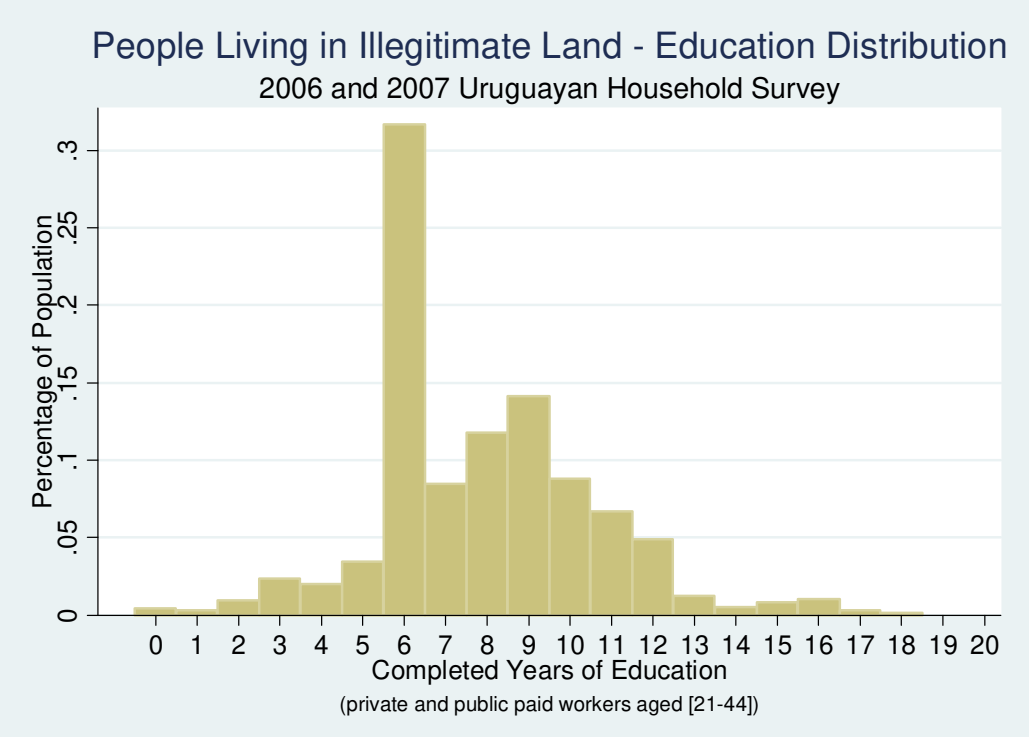
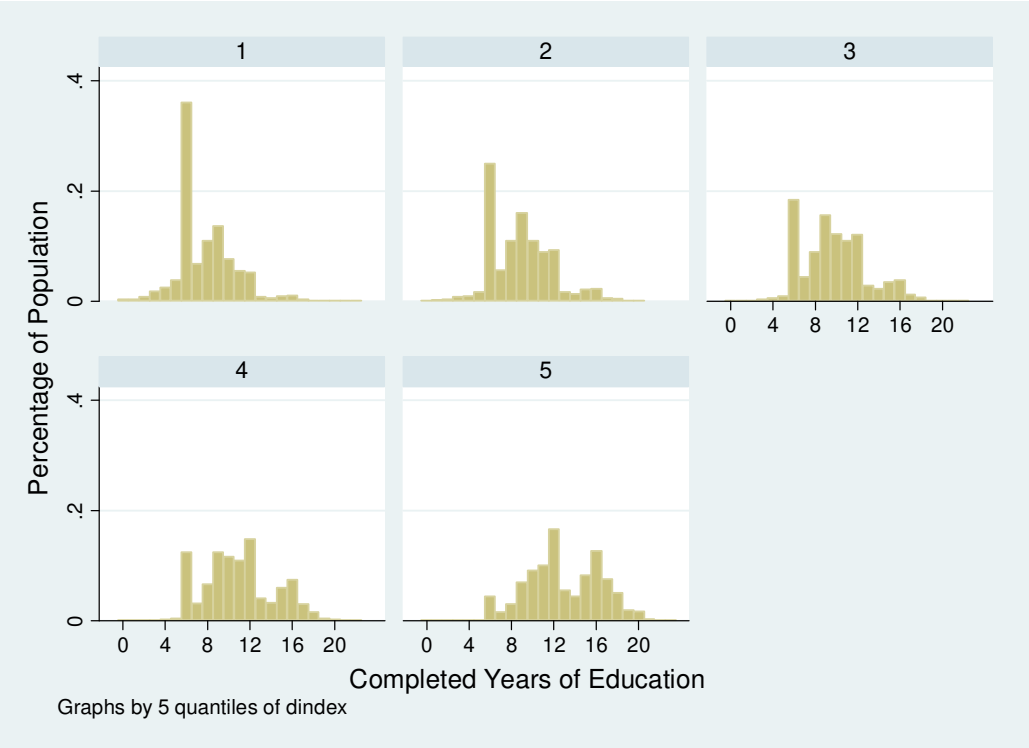
Graph 1



Graph 2



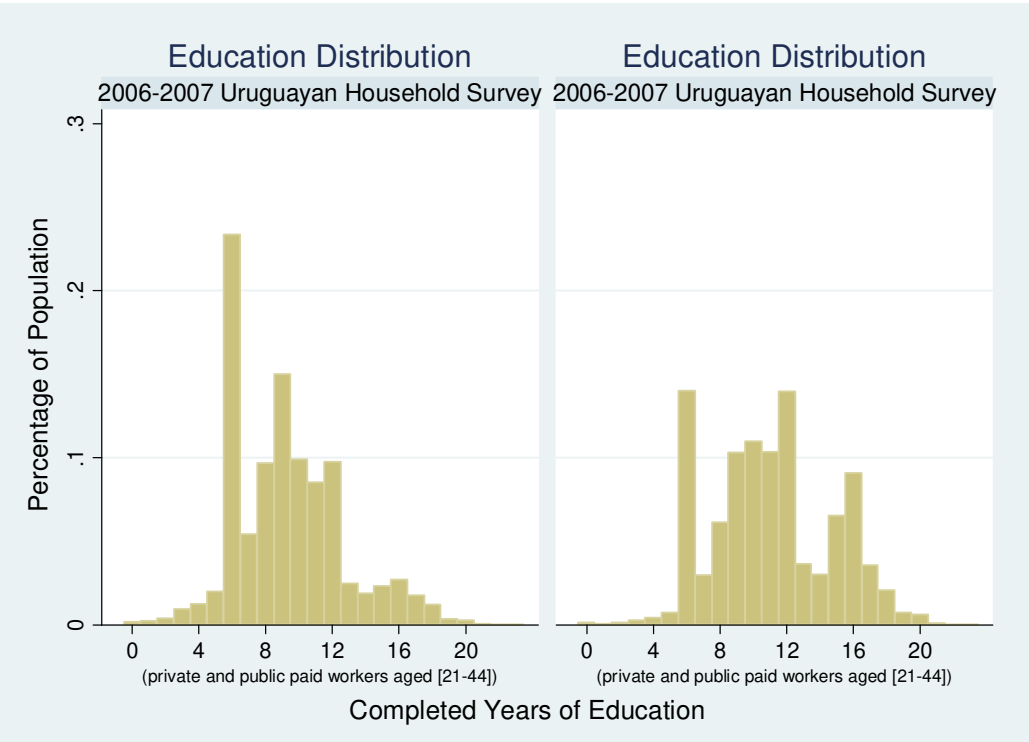
Graph 3 - Education Distribution – Quintiles of Poverty – 2006 and 2007 Uruguayan Household Survey – Private and Public Paid Workers aged [21-44]



Note: "dindex" is a relative deprivation index which takes values between 0 (poor) and 1(rich). In this graph, the quintiles are ordered from 1st quintile (poor) to 5th quintile (rich)

Graph 4 – Education Distribution by gender

Male **Female**



Graph 5

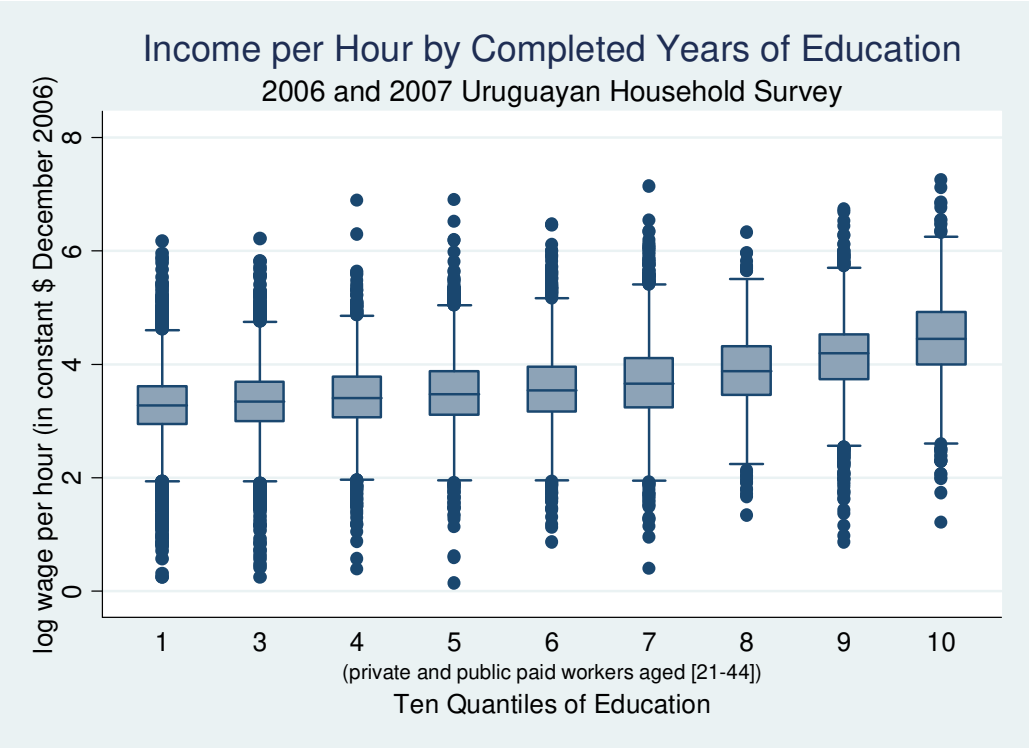

Income per Hour by Completed Years of Education
2006 and 2007 Uruguayan Household Survey
log wage per hour (in constant $ December 2006)
0
2
4
6
8
1
3
4
5
6
7
8
9
10
(private and public paid workers aged [21-44])
Ten Quantiles of Education

Table 1 – Descriptive Statistics - Years 2006-2007 – Private and Public Paid Workers Aged [21-44]

	Last Educational Achievement: Primary School Completed	**Last Educational Achievement: Junior High School**	**Difference**	**p-value**
Number of Years Working in the Present Job	5.731	5.761	-.0304	0.746
Internet	.019	.072	-.052***	0.000
Married	.409	.378	.030***	0.000
Informal Job	.245	.201	.044***	0.000
Public Job	.115	.149	-.034***	0.000
Has Children	.746	.697	.049***	0.000
Hours Worked by Week in her/his Principal Job	46.66	46.24	.42**	0.046
Number of Jobs	1.070	1.088	-.018***	0.000
In a Public Housing Program	.024	.024	0.000	0.000
Using Public Refectories for the Poor	.029	.015	.013***	0.000
Primary Education all at Public School	.977	.921	.056***	0.000
Secondary Education at Public School		.967		
Number of People at Home	4.134	3.931	.203***	0.000
Number of people with personal income at home	2.556	2.470	.085***	0.000
House Ownership	.529	.574	-.044***	0.000
Rooms per capita	.555	.586	-.031***	0.000
House Receiving Remittances	.011	.019	-.007***	0.000
Number of Unemployed at Home	.159	.144	.014**	0.017
Female	.309	.339	-.029***	0.000

Table 2 – Descriptive Statistics - Years 2006-2007 – Private and Public Paid Workers Aged [21-44]

	Last Educational Achievement: High School Completed	**Last Educational Achievement: Four, Five or Six Completed Years of Undergraduate**	**Difference**	**p-value**
Number of Years Working in the Present Job	6.474	6.812	-.337***	0.004
Internet	.231	.512	-.281***	0.000
Married	.384	.433	-.048***	0.000
Informal Job	.107	.061	.045***	0.000
Public Job	.194	.441	-.246***	0.000
Has Children	.570	.464	.106***	0.000
Hours Worked by Week in her/his Principal Job	43.23	34.73	8.49***	0.000
Number of Jobs	1.105	1.300	-.195***	0.000
In a Public Housing Program	.022	.024	-.001	0.514
Using Public Refectories for the Poor	.005	.004	0.001	0.570
Primary Education all at Public School	.798	.644	.154***	0.000
Secondary Education at Public School	.838	.637	.200***	0.000
Number of People at Home	3.55	3.18	.37***	0.000
Number of people with personal income at home	2.37	2.21	.15***	0.000
House Ownership	.628	.630	-.001	0.841
Rooms per capita	.660	.723	-.062***	0.000
House Receiving Remittances	.024	.018	.006**	0.021
Number of Unemployed at Home	.097	.063	.034***	0.000
Female	.375	.364	.011	0.177

Table 3 – Impact of an Additional Year of Education on Wages – Second Stage of Instrumental Variable Estimation – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-30]	.196 (.007)***	.150 (.006)***	14336 (Male) 9916 (Female)
[31-44]	.206 (.007)***	.190 (.006)***	18958 (Male) 14791(Female)
Controls: -Labour Experience -Married -Informal Job -Public Job -Regional Dummies	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Appendix of Table 3 – First Stage Instrumental Variable Estimation (Impact of an Additional Year of Education on Wages) – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-30]	.473 (.012)***	.520 (.010)***	14336 (Male) 9916 (Female)
[31-44]	.421 (.011)***	.463 (.010)***	18958 (Male) 14791(Female)
Controls: -Labour Experience -Married -Informal Job -Public Job -Regional Dummies	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Table 4 – Poverty: People in the First Quintile - Second Stage Instrumental Variable Estimation (Impact of an Additional Year of Education on Wages) – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-34]	.131 (.017)***	.050 (.013)***	4948 (Male) 2385 (Female)
[35-44]	.166 (.042)***	.095 (.030)***	2862 (M) 1502 (F)
Controls: -Labour Experience -Married -Informal Job -Public Job -Regional Dummies	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Appendix of Table 4 – Poverty: People in the First Quintile – First Stage of Instrumental Variable Estimation (Impact of an Additional Year of Education on Wages) – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-34]	.478 (.030)***	.421 (.021)***	4948 (Male) 2385 (Female)
[35-44]	.245 (.035)***	.222 (.025)***	2862 (M) 1502 (F)
Controls: -Labour Experience -Married -Informal Job -Public Job -Regional Dummies	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis - ***p<0.01; **p<0.05; *p<0.10

Table 5 - Impact of Junior High School vs. Completed Primary School on Wages – Second Stage of Instrumental Variable Estimation – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-25]	.287 (.176)	.077 (.116)	2265 (Male) 878 (Female)
[26-30]	.281 (.139)**	.174 (.075)**	2755 (M) 1190 (F)
[31-35]	.175 (.168)	.355 (.094)***	2757 (M) 1223 (F)
[36-40]	.161 (.150)	.274 (.093)***	2735 (M) 1357 (F)
[41-44]	.166 (.147)	.391 (.123)***	2267 (M) 1366 (F)
Controls:			
-Labour Experience	Yes	Yes	
-Married	Yes	Yes	
-Informal Job	Yes	Yes	
-Public Job	Yes	Yes	
-Regional Dummies	Yes	Yes	

Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Appendix of Table 5 - First Stage of Instrumental Variable Estimation (Impact of Junior High School vs. Completed Primary School on Wages) – Education Level Instrumented by Mean Education Level by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-25]	.432 (.048)***	.416 (.029)***	2265 (Male) 878 (Female)
[26-30]	.476 (.040)***	.534 (.027)***	2755 (M) 1190 (F)
[31-35]	.440 (.045)***	.467 (.027)***	2757 (M) 1223 (F)
[36-40]	.446 (.040)***	.473 (.027)***	2735 (M) 1357 (F)
[41-44]	.489 (.036)***	.473 (.029)***	2267 (M) 1366 (F)
Controls:			
-Labour Experience	Yes	Yes	
-Married	Yes	Yes	
-Informal Job	Yes	Yes	
-Public Job	Yes	Yes	
-Regional Dummies	Yes	Yes	

Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Table 6 - Impact of Completed High School vs Junior High School on Wages – Second Stage of Instrumental Variable Estimation – Education Instrumented by Mean Education by Age and by Region – Years 2006-2007

Age Rank	Female	Male	Observations
[21-25]	.327 (.109)***	.319 (.090)***	1763 (Male) 1124 (Female)
[26-30]	.526 (.120)***	.386 (.094)***	1862 (M) 1377 (F)
[31-35]	.896 (.118)***	.316 (.092)***	1772 (M) 1331 (F)
[36-40]	.508 (.120)***	.474 (.094)***	1596 (M) 1187 (F)
[41-44]	.977 (.270)***	1.143 (.171)***	1258 (M) 982 (F)
Controls:			
-Labour Experience	Yes	Yes	
-Married	Yes	Yes	
-Informal Job	Yes	Yes	
-Public Job	Yes	Yes	
-Regional Dummies	Yes	Yes	

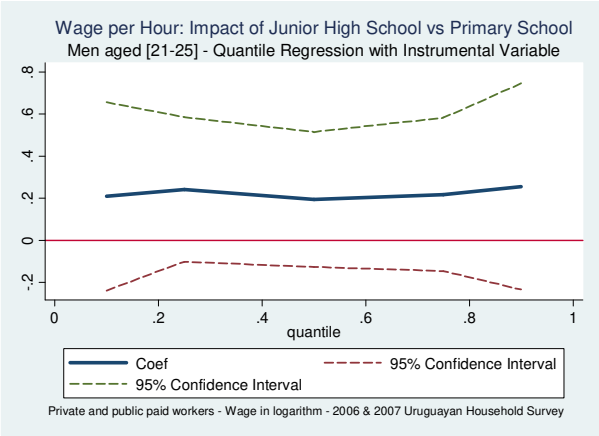
Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

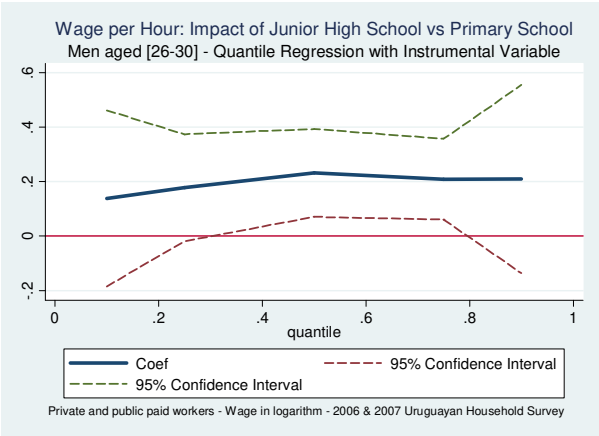
Appendix 6 – First Stage of Instrumental Variable Estimation (Impact of Completed High School vs. Junior High School on Wages) – Education Level Instrumented by Mean Education Level by Age and by Region – Years 2006-2007

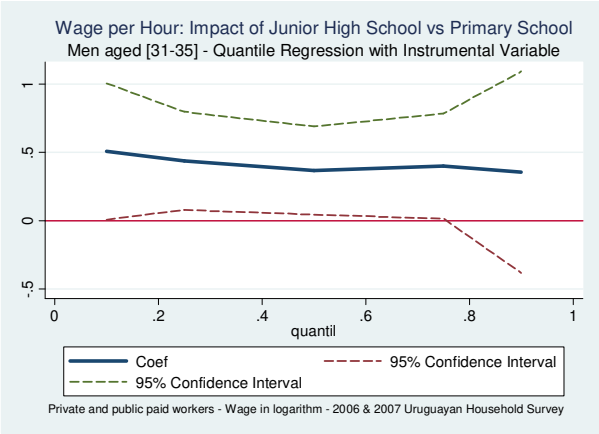
Age Rank	Female	Male	Observations
[21-25]	.563 (.038)***	.564 (.031)***	1763 (Male) 1124 (Female)
[26-30]	.494 (.034)***	.500 (.029)***	1862 (M) 1377 (F)
[31-35]	.539 (.033)***	.538 (.028)***	1772 (M) 1331 (F)
[36-40]	.543 (.036)***	.577 (.031)***	1596 (M) 1187 (F)
[41-44]	.317 (.037)***	.416 (.031)***	1258 (M) 982 (F)
Controls:			
-Labour Experience	Yes	Yes	
-Married	Yes	Yes	
-Informal Job	Yes	Yes	
-Public Job	Yes	Yes	
-Regional Dummies	Yes	Yes	

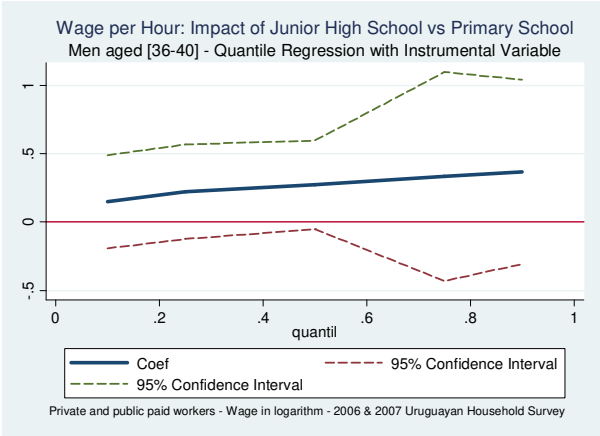
Robust standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

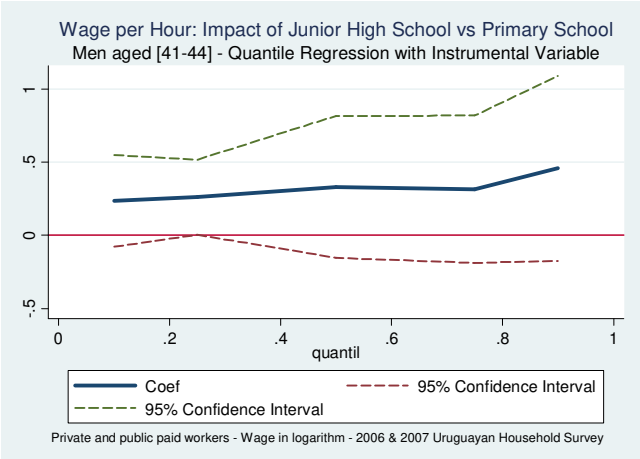
Impact on Men



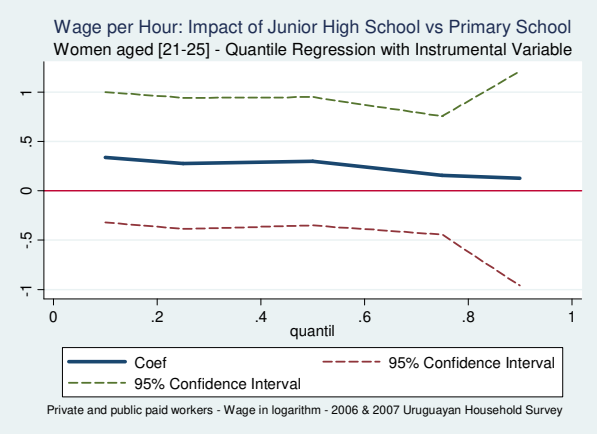


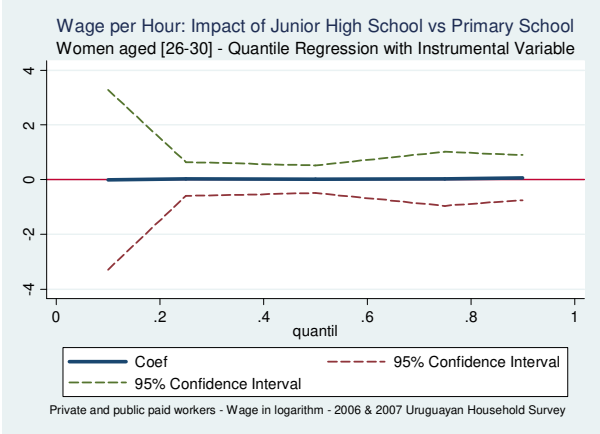


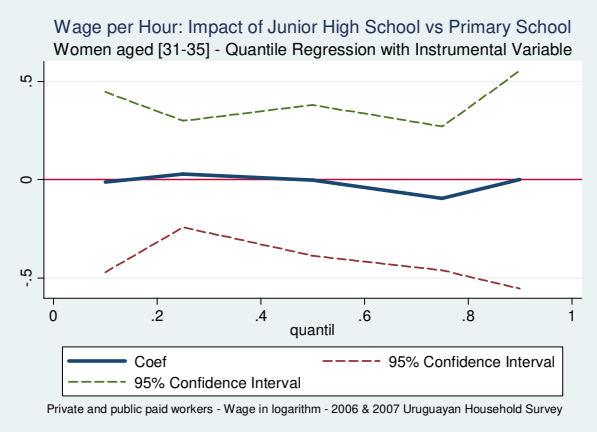


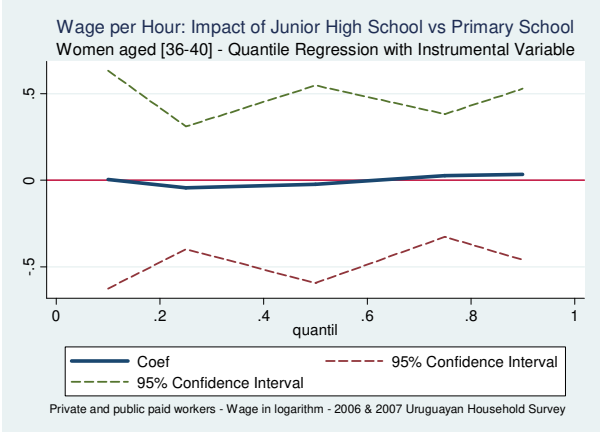


Impact on Women









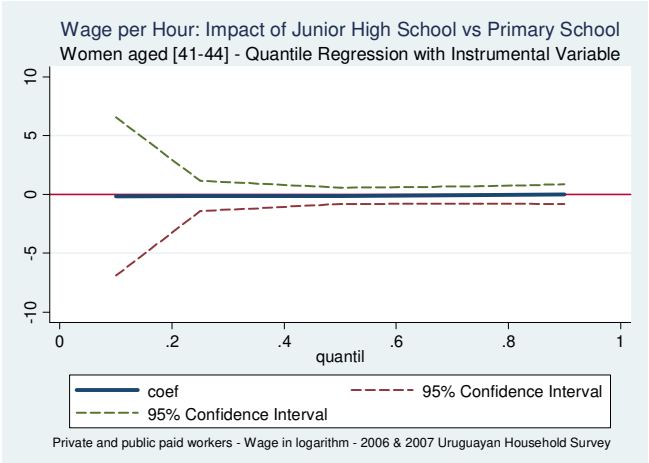


Table 7 – Poverty: People in the First Quintile - Quantile Regression with Instrumental Variables Estimation - Impact of Junior High School vs. Completed Primary School on Wages – Years 2006-2007

Quantiles Age Rank	Q10	Q25	Q50	Q75	Q90	Observations
[21-25] Male	.327 (.231)	.254 (.151)*	.242 (.151)	.215 (.248)	.127 (.171)	856
"" Female	.311 (.160)*	.391 (.121)***	.393 (.137)***	.360 (.162)**	.297 (.401)	303
[26-30] Male	.097 (.142)	.156 (.138)	.122 (.100)	.121 (.099)	.108 (.136)	931
"" Female	-.125 (.163)	-.338 (.163)**	-.124 (.370)	.033 (.230)	.013 (.356)	372
[31-35] Male	.454 (.192)**	.392 (.402)	.390 (.292)	.374 (.243)	.260 (.275)	876
"" Female	-.135 (.430)	-.172 (.198)	-.243 (.252)	-.302 (.297)	.038 (.199)	334
[36-44] Male	.135 (.108)	.093 (.100)	.144 (.103)	.214 (.109)*	.276 (.146)*	1447
"" Female	.047 (.738)	.019 (.246)	-.011 (.182)	.034 (.200)	-.047 (.149)	695
Controls: -Labour Experience	Yes	Yes	Yes	Yes	Yes	
-Married	Yes	Yes	Yes	Yes	Yes	
-Informal Job	Yes	Yes	Yes	Yes	Yes	
-Public Job	Yes	Yes	Yes	Yes	Yes	
-Regional Dummies	Yes	Yes	Yes	Yes	Yes	

Bootstrap standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10

Table 8 – Quantile Regression with Instrumental Variables Estimation - Impact of Completed High School vs Junior High School on Wages – Years 2006-2007

Quantiles Age Rank	Q10	Q25	Q50	Q75	Q90	Observations
[21-25] Male	.251 (.187)	.254 (.114)**	.275 (.103)***	.370 (.101)***	.265 (.227)	1763
“” Female	.161 (.156)	.181 (.120)	.243 (.098)**	.381 (.186)**	.420 (.221)*	1124
[26-30] Male	.310 (.107)***	.289 (.113)**	.334 (.123)***	.412 (.154)***	.570 (.492)	1862
“” Female	.440 (.285)	.418 (.176)**	.462 (.194)**	.559 (.163)***	.659 (.199)***	1377
[31-35] Male	.228 (.200)	.279 (.120)**	.434 (.100)***	.580 (.112)***	.486 (.126)***	1772
“” Female	.610 (.189)***	.716 (.152)***	.711 (.108)***	.760 (.107)***	.798 (.171)***	1331
[36-40] Male	.271 (.124)**	.362 (.098)***	.436 (.108)***	.514 (.144)***	.860 (.263)***	1596
“” Female	.252 (.196)	.353 (.158)**	.464 (.103)***	.517 (.128)***	.548 (.215)**	1187
[41-44] Male	.662 (.313)**	.778 (.346)**	.861 (.282)***	1.097 (.169)***	1.091 (.238)***	1258
“” Female	.438 (1.07)	.450 (.292)	.381 (.259)	.640 (.450)	1.023 (.460)**	982
<u>Controls</u>: -Labour Experience -Married -Informal Job -Public Job -Regional Dummies	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes	

Bootstrap standard errors in parenthesis
***p<0.01; **p<0.05; *p<0.10