

Preschool Attendance and School-Age Profiles: More Evidence

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Data collected from the Uruguayan household survey (ENHA) of year 2006 is used to provide more evidence on the longer-term impact of pre-primary education on school drop-out rates and school grade failures. In order to control for unobserved individual or household characteristics that may affect both the participation in a preschool program and the later educational attainment, we instrumented preschool attendance with average attendance rates by age in each locality. Two major contributions of this paper: for the first time, ENHA makes possible to work with real data on school grade repetitions (till now, there's no data to estimate accurately the possible lag in children education); and also it is the first time that information of rural areas is available. The results show that children who attended preschool are more likely to not desert from school and have lower grade repetition rates. This affirmation is also valid for especially vulnerable subpopulations: children living in illegitimate terrains; households living in poverty; children whom mother has few years of formal education. Spreading out preschool education seems to be a successful policy option in a country with large grade repetition and drop-out rates. (JEL: I2, J1)

1. Introduction

Previous research in Uruguay about the impact of pre-primary school attendance on the subsequent educational attainment concentrates in children living in a two parent family and employs the following indicators of subsequent achievements: school drop-outs rates and number of accumulated years of formal education. However, this last indicator is far from a perfect indicator due to the limitations of the data available in Uruguay: the survey does not include a question about the birthday of the child. Thus, since no child could start primary school till he/she is 6 years old at least on April 30th, there's no means to know exactly if each child is in the correct grade school or if the kid is suffering from educational gap and how many years his education is lagging.

The present paper employs the 2006 Extended National Household Survey (Encuesta Nacional de Hogares Ampliada – ENHA) that includes also regions and cities with less than 5,000 inhabitants which were not covered in surveys for past years, and, for the first time, a specific question about the number of school grade repetitions: in this way, this new survey provides an additional appropriate indicator of school achievements. Also, we extend previous research by taking into account not only those children who live in a two parent family but also those who live with only one parent. Heckman (2008) states that family environment -that has changed significantly in the last 40 years- could play a powerful role in shaping children outcomes. It seems to be interesting to take into account family structure for the estimations: in 2006 the children, between 8 and 14 years old, who live with both

biological parents are far from 100 percent: they are 57 percent. In addition, we pay particular attention to those subpopulations which could be especially vulnerable (children living in illegitimate terrains; households living in poverty; children whom mother has few years of formal education; families where the father is not at home). One subpopulation that requires a special attention in Uruguay is the one formed by those who are able to attend high school (individuals who are twelve years old or more): Kaztman (2006) shows that more than 35 percent of the individuals between 12 and 17 years old attend school with a gap. And this figure grows to near 60 percent in the case of sons living in poverty.

2. Background

Katzman (2006) provides us with a summary of the educational situation in Uruguay at year 2006. Since early 1990's, pre-primary education has been promoted from the government and has showed an important increase. In the years 2005-2006, 95 percent of the children aged 5 attended preschool, 79 percent of aged 4 attended this program, and 54 percent of overall children who are less than six years old attended preschool (and one third of them attended private preschool).

[Insert Figure 1]

Figure 1 shows that preschool attendance for kids aged 4-5 growth from 58% in 1991 to 85 in 2006. The increase were more pronounced in the public preschools where the augmented from 32% in 1991 to 66% in 2006.

[Insert Figure 2]

The increase in preschooling was particularly relevant for families in the bottom of the income distribution (see Figure 2). Preschool attendance for kids aged 4-5 living in families in the lowest two quintiles of the income distribution increased from 50% in 1991 to 82% in 2006.

Berlinski (2008) studies the effect of pre-primary education on children's subsequent school outcome: number of accumulated years of formal education and probability of school drop-out. They focus on individuals aged 7-15 and use Uruguayan household survey (ECH) –from 2001 to 2005- that collects retrospective information on preschool attendance. They find small gains from preschool attendance at early ages that magnify as children grow up. The authors employ the within household estimator to control for unobserved determinants of school progression. Additionally, they use the instrumental variable estimator using average attendance rates by locality of residence and birth cohort as instruments.

Currie (2002) provides evidence on the longer-term effects of Head Start, a public program for poor preschool-age children. They use panel data from Panel Survey of Income Dynamics (PSID) and focus on four adult outcomes: completion of high school, attendance at some college, $\ln(\text{earnings})$ if the household member worked, and whether the household member ever reported being booked or charged with a crime. The authors find that whites who attended Head Start are, relative to their siblings who did not, significantly more likely to complete high school and attend college, and African-Americans who participated in the program are less likely to have been booked or charged with a crime. They also find some evidence of positive spill-over from older Head Start children to their younger siblings.

Black (2008) studies the long-term effects of the preschool starting age and uses data on the population of Norway. The authors focus on longer-run outcomes such as IQ scores at age 18, educational attainment, teenage pregnancy, and earnings. Because parents may be able to manipulate school starting age, they find an instrument to identify the true relationship between school starting age and outcomes. Their exogenous variation in school starting age comes from variation in month of birth and the administrative school starting rule in Norway – children born in December start school a year earlier than children born in January, with a December 31 cutoff. Therefore, they employ 2SLS estimation using the expected school starting age as an instrument for the actual school starting age. Conceptually similar to the case of school starting age, in the case of IQ they use the year in which you were supposed to take the test as an instrument for the age at which did take the test. They find evidence for a small positive effect of starting school younger on IQ scores measured at age 18. In contrast, they find evidence of much larger positive effects of age at test, and these results are very robust. They also find that starting school younger has a significant positive effect on the probability of teenage pregnancy, but has little effect on educational attainment of boys or girls. There appears to be a short-run positive effect on earnings of beginning school at a younger age; however, this effect has essentially disappeared by age 30. They state that this pattern is consistent with the idea that starting school later reduces potential labour market experience at a given age for a given level of education; however, this becomes less important as individuals age.

3. Data

We use cross-sectional data of the year 2006 from Extended National Household Survey (Encuesta Nacional de Hogares Ampliada – ENHA) which includes socio-economic information of households and individuals (such as retrospective information of preschool attendance which is our variable of interest).

The ENHA is Uruguay's main household survey. It is administered by the National Institute of Statistics (Instituto Nacional de Estadística – INE) on an annual basis and contains questions both at the individual and household level concerning housing, income, wages, labour market and schooling status. The survey is representative of the entire nation, including urban and rural regions. Specifically for the year 2006, it has a rather uncommon feature because it collects not only urban data but also rural data and information from towns with less than 5,000 inhabitants. Approximately 87,000 households and 260,000 individuals are surveyed, representing 8.33% of total households in the nation.

The extensiveness of the ENHA survey allows us a large number of controls. Given the large number of observation that we can count on in the ENHA (92,500 households representing 8.3% of all the population of households), we can improve the precision of the estimations.

We take into account only sons and daughters with ages which fall in the interval [7,15] (a sample size of 17,456 which corresponds with the first and third quarter of year 2006): the usual age entry at school is 6 years old and it is compulsory to be at least in school till the individual finishes the basic schooling cycle that implies approximately 15 years old. In the interval [7,15], 83 percent of the children attended preschool when they were 5 or less years old (there's no difference in the boys and girls attendance). This figure talks about the significant extension of the preschool program in Uruguay.

[Insert Table 1]

The table 1 shows the means difference of individual and household characteristics between the children who attended pre-primary school and those who not. The former have, in average, lower school drop-out and grade retention rates; and a greater proportion of these children study now at private schools. Also their average family structure includes fewer children, fewer people with personal income and parents with more years of formal education.

4. Results

Looking for the impact of preschool attendance on subsequent educational achievements, we start estimating an OLS¹ regression. Besides the traditional household controls (number of children at home, parent's education, wealth, etc.), we include the age of the child, to cope with the possible bias due to children's exposure to different educational public policy or government interventions along the years. Other controls are the region of the country – that could imply different environment, wealth, resources ...-, and the sector of the economy in which parents work (there are some industries which help workers especially with their children's education). Finally we include child gender also as a control because of the possible bias introduced by households that invest more in a child taking gender into consideration.

[Insert Table 2]

Table 2 shows the results of this OLS estimation and suggests significant positive effects of preschool attendance on different indicators of subsequent educational performance.

[Insert Table 3]

Critics of the extension of the preschool program could argue that the benefits are only short-term ones and that these not lasting benefits “fade out” for many children. But the results of an OLS estimation using the preschool dummy interacted with age dummies, shown in table 3, suggests just the contrary: the effect of preschool attendance on stay-on rates increases with the age and does not seem to disappear at greater ages. While at age 8 the difference in drop-out rate between treated and untreated is below one percent, at age 13 this difference is near 10 percent, and at age 15 remains above 5 percent. Also preschool attendance has similar effects on school grade repetitions by age (this result is not included in this paper in order to reduce the number of charts in favour of the reader): the positive effect of pre-primary education on reducing grade retentions grows with children's age and does not disappear at greater ages.

[Insert Tables 4 and 5]

While an experiment in which children were randomly assigned to preschool or to a control group and then tracked for ten years might be the ideal way to evaluate the effects of preschool on subsequent years, such experimental evaluations of

¹ Due to the dependent variable (“Drop-out” or “Grade Repetition”) is binary and takes the values 0 and 1, each OLS estimation that appears in this paper has its proper Probit backup estimation. We show only the OLS results because they are more direct to be interpreted.

preschool in Uruguay do not exist. With the data actually available, our strategy is different. In order to control for unobserved individual or household characteristics that may affect both the participation in a preschool program and the later educational attainment, we instrumented preschool attendance with average attendance rates by age in each locality, following Berlinski (2008): these average attendance rates are significantly correlated with preschool attendance as is shown in table 4, while this instrumental variable seems to be uncorrelated with children's unobserved characteristics. Table 5 shows the second stage of the instrumental variable approach and the results confirm that the pre-primary education would imply better subsequent educational attainments: the children who attended preschool have lower drop-out rates and lower school grade retentions.

[Insert Tables 6 and 7]

Tables 6 and 7 show the effect of preschool attendance on educational attainments by subpopulations. Results for each child gender suggests that both boys and girls perceive benefits –in terms of lower grade repetitions and greater stay-on rates- from preschool attendance. These positive effects of the preschool attendance on subsequent educational achievements are also present in especially vulnerable subpopulations: the case of the family structure that not includes the presence of the father; households with low educated mothers; and individuals living in poverty. Finally, though we are not able to find a significant effect on the grade repetition for those who could be in junior High School –age among [13-15]- or those who live in illegitimate terrains, the fact of attend preschool decreases the probability of school drop-out in both subpopulations.

In summary, there's empirical evidence that suggests a positive effect of preschool attendance on subsequent educational attainments. Berlinski (2008) looks for explanations for these facts. From an economic perspective, they found that the explanation could be that the returns to human capital investments decline during the life cycle and the opportunity costs of attending school at short ages is low. The authors also sum literature from neuroscience and psychology and states that cognitive stimulation in early life is critical for long term skill development. Thus, pre-primary education facilitates the process of cognitive stimulation by providing systematic activities for the children, and also preschool helps non-cognitive skills such as children's socialization (and parent's) and self-control needed in formal education. Heckman (2008) points out the importance of non-cognitive skills and criticizes public policies that concentrate attention solely on achievement test scores and do not evaluate important non-cognitive factors that promote success in school and life.

5. Conclusions

Looking from more empirical evidence about the consequences of pre-primary education on subsequent educational achievements, this paper uses recent cross sectional data from ENHA Survey which includes a new question about school grade repetition –important information for building a child performance indicator- and covers a more representative sample of Uruguay because for the first time also includes regions with less than 5,000 inhabitants. From a methodological point of view, the present research employs instrumental variable techniques to handle possible bias caused by children or household unobserved characteristics. The results show a significant effect of preschool attendance on later educational attainment which is measured by two indicators: drop-out rates and school grade repetitions. And this finding, which is in line with previous literature, also is present

in specially vulnerable subpopulations such as: individuals in the rank of age [13,15] who are expected to study secondary school; those children living in illegitimate terrains; children whom mother has few years of formal education; families where the father is not at home and thus would have less material and human capital; households living in poverty. In other words, spreading out preschool education seems to be a successful policy option in a country with large grade repetition and drop-out rates.

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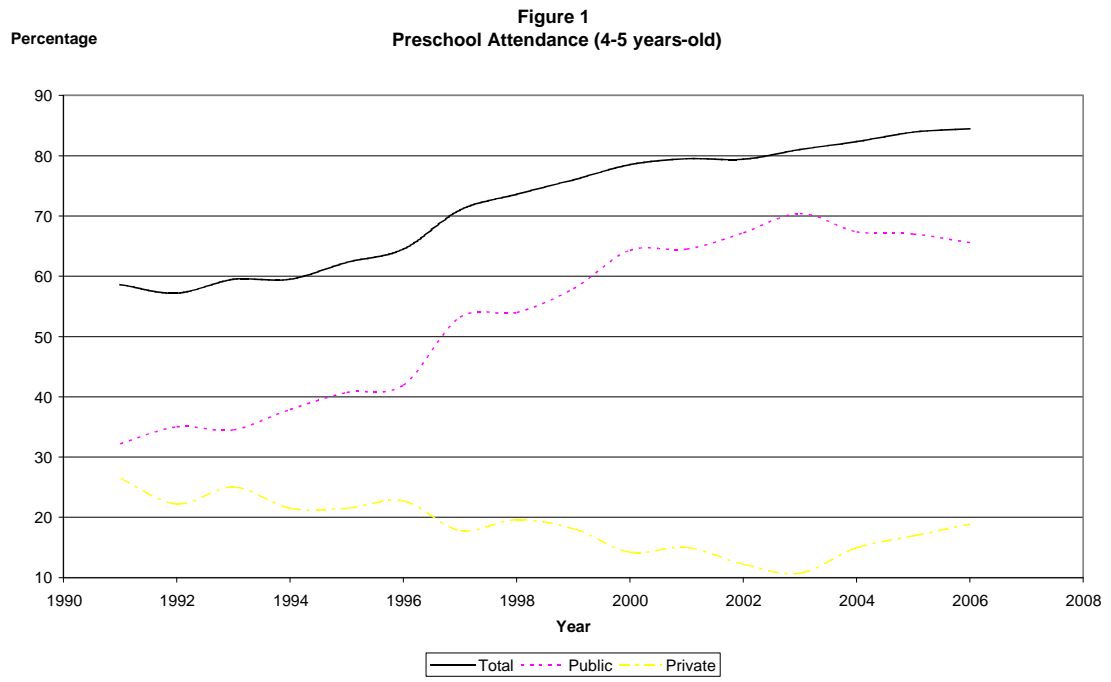
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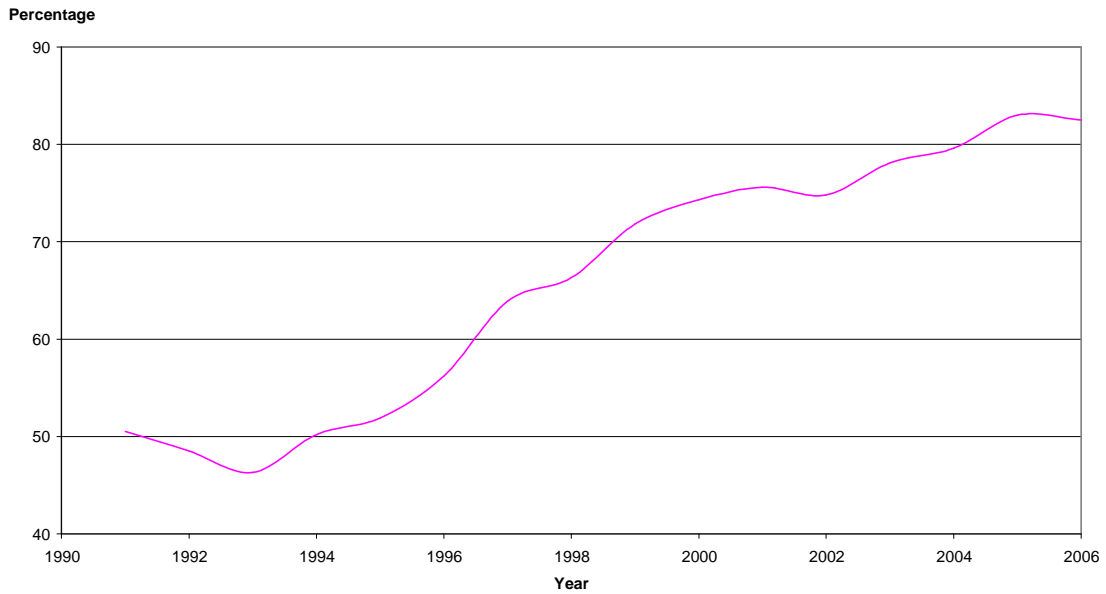
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Source: ANEP (Administración Nacional de Enseñanza Primaria)

Figure 2
Preschool Attendance (4-5 years-old) - 1st and 2nd Income Quantile



Source: ANEP (Administración Nacional de Enseñanza Primaria)

Table 1 – Descriptive Statistics: Means – Children among [7, 15] years old with previous preschool attendance and without previous preschool attendance - Uruguay – 2006 ENHA Survey

	With Preschool	Without Preschool	Difference	p-value
Girls	.49	.46	.03***	0.000
Drop out from School	.02	.09	-.07***	0.000
One Grade Repetition at Least	.26	.40	-.14***	0.000
Private School at Present	.15	.09	.06***	0.000
Living with both Biological Parents	.69	.67	.02***	0.000
Living at an Illegitimate terrain	.04	.06	.02***	0.000
Mother's Age	39	39		
Father's Age	43	43		
Number of persons 13 years old or less	2.07	2.27	-0.2***	0.000
Number of people with personal income	2.49	2.68	-.19***	0.000
Without Personal Identification Card	.016	.030	-.014***	0.000

Mother with more than Two Dead Children	.023	.034	-.011***	0.000
Illiterate Mother	.007	.021	-.014***	0.000
Illiterate Father	.015	.030	-.015***	0.000
Mother's Years of Education	9.09	7.66	1.43***	0.000
Father's Years of Education	7.26	6.34	.92***	0.000
Using Public Refectories for the Poor	.178	.203	.025***	0.000

*** $p < 0.01$; Sample Size= 17,456.

Table 2 – Impact of Preschool Attendance on Drop-out and Grade Repetitions - OLS Regression - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Observations:17,456	Dependent Variable: Drop-out (takes values 1 and 0)	Dependent Variable: At Least One Grade of School Repetition (takes values 1 and 0)	Dependent Variable: Years of School Repetitions (takes values 0, 1 and 2, where 2 means more than one grade repetition)
Preschool	-.045 (.001)***	-.044 (.001)***	-.079 (.003)***
<u>Controls:</u> -Child Gender -Child Age -Regional Dummies -Sectors of Activity of Parents' Job -Household Data (mother's education, wealth Indicators, living with both biological parents, # of children at home, # of people with income at home)	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes

Robust Standard Errors in Parenthesis

***p<0.01

Table 3 – Effect of Preschool Attendance by Age on Drop-out - OLS Regression - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Observations:17,456	Dependent Variable: Drop-out
Preschool x Age = 8	-.003 (0.000)***
Preschool x Age =9	-.031 (0.000)***
Preschool x Age =10	-.056 (0.001)***
Preschool x Age =11	-.080 (0.001)***
Preschool x Age =12	-.101 (0.001)***
Preschool x Age =13	-.098 (0.002)***
Preschool x Age =14	-.078 (0.002)***
Preschool x Age =15	-.059 (0.003)***
Controls: -Child Gender -Child Age -Regional Dummies -Sectors of Activity of Parents' Job -Household Data (mother's education, wealth Indicators, living with both biological parents, # of children at home, # of people with income at home)	Yes Yes Yes Yes Yes

Robust Standard Errors in Parenthesis

***p<0.01

Table 4 – First Stage Instrumental Variables Estimation - Average of Preschool Attendance by Age in each Locality as Instrument of Preschool Attendance - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Observations:17,456	Dependent Variable: Preschool Attendance
Average Preschool Attendance by Age in each Locality	.957 (.005)***
<u>Controls:</u> -Child Gender -Child Age -Regional Dummies -Sectors of Activity of Parents' Job -Household Data (mother's education, wealth Indicators, living with both biological parents, # of children at home, # of people with income at home)	Yes Yes Yes Yes Yes

Robust Standard Errors in Parenthesis

***p<0.01

Table 5 – Second Stage Instrumental Variables Estimation - Average of Preschool Attendance by Age in each Locality as Instrument of Preschool Attendance - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Observations:17,456	Dependent Variable: Drop-out (takes values 1 and 0)	Dependent Variable: At Least One Grade of School Repetition (takes values 1 and 0)	Dependent Variable: Years of School Repetitions (takes values 0, 1 and 2, where 2 means more than one grade repetition)
Preschool	-.119 (.003)***	-.079 (.006)***	-.158 (.009)***
<u>Controls:</u> -Child Gender -Child Age -Regional Dummies -Sectors of Activity of Parents' Job -Household Data (mother's education, wealth Indicators, living with both biological parents, # of children at home, # of people with income at home)	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes

Robust Standard Errors in Parenthesis

***p<0.01

Table 6 – Impact of Preschool Attendance on School Grade Repetition among Subpopulations - Instrumental Variables Estimation - Average of Preschool Attendance by Age in each Locality as Instrument of Preschool Attendance - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Dependent Variable: At Least One Grade of School Repetition							
	Girls	Boys	Age [13, 15]	Individuals aged [10,15] living in households without father	Individuals whose mother has less than average education	Individuals aged [13,15] living in poverty	Children living in illegitimate terrain
Preschool	-.098 (.008)***	-.066 (.009)***	-.008 (.010)	-.059 (.021)***	-.057 (.009)***	-.028 (.014)*	-.012 (.028)
Controls:							
Child Gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectors of Activity of Parents' Job	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,615	8,841	5,912	2,084	8,554	3,506	930

Robust Standard Errors in Parenthesis

***p<0.01; *p<0.10

Table 7 – Impact of Preschool Attendance on School Drop-out among Subpopulations - Instrumental Variables Estimation - Average of Preschool Attendance by Age in each Locality as Instrument of Preschool Attendance - Children among [7, 15] years old - Uruguay – 2006 ENHA Survey

Dependent Variable: School Drop-out							
	Girls	Boys	Age [13, 15]	Individuals aged [10,15] living in households without father	Individuals whose mother has less than average education	Individuals aged [13,15] living in poverty	Children living in illegitimate terrain
Preschool	-.102 (.004)***	-.137 (.004)***	-.146 (.007)***	-.083 (.012)***	-.145 (.005)***	-.203 (.011)***	-.223 (.020)***
Controls:							
Child Gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sectors of Activity of Parents' Job	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,615	8,841	5,912	2,084	8,554	3,506	930

Robust Standard Errors in Parenthesis

***p<0.01; *p<0.10