Poor Little Children: The Socioeconomic Gap in Parental Responses to School Unreadiness*

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Abstract

We use detailed data on parental investment to study how parents react to a widely used school policy that puts some children at a learning disadvantage. In line with findings in other countries, we document that younger children in Spain perform significantly worse at school than their older peers and –key to causal interpretation– that for the children born in winter this effect is not due to seasonality in birth patterns. Going further, we show that this age of school entry effect is significantly greater among children from disadvantaged families. To understand why, we analyze data on parental investment and find that college educated parents increase their time investment and choose schools with better inputs when their children are the youngest in their classroom, while non-college educated parents do not.

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I. Introduction

Parental responses to school policies can amplify or mitigate the (un)planned effects of policy, if parents react by changing investment in their children. If complementary (compensatory) responses to positive(negative) policy effects depend on parental resources, the interaction between policy impacts and children's socioeconomic background can have negative consequences on efficiency and inequality. Our understanding of such responses is limited though, because a proper empirical analysis requires both exogenous variation in exposure to policy and the availability of detailed data on parental investment.

In this paper, we study how parents from different socioeconomic backgrounds react to a widely used school policy that puts some children at a learning disadvantage. In Spain, a strict birthday cutoff for school entry generates exogenous variation in the age at which students start school. In line with findings in other countries, we document that younger children perform significantly worse at school than their older peers and –key to causal interpretation– that for the children born in winter this effect is not due to seasonality in birth patterns. We study how this effect varies among children from different socioeconomic backgrounds and use detailed data on parental time use and school inputs to analyze parental investment.

Most countries dictate that children born during a given one-year period should start school at the same time. This (up to one year of) difference in the age of students in the same classroom can potentially be reflected in performance. Younger children might be less ready to acquire knowledge and, overall, to deal with the experience of formal schooling. If initial outcomes shape future investment, the age at school entry can have long-term consequences in schooling and labor market trajectories.[1]

A large body of literature shows that starting school at an earlier age is indeed

1. See Grenet (2011) for a discussion of the mechanisms through which starting school at an earlier age can have long-term impacts.

related to worse student performance (see, for example, Bedard and Dhuey, 2006 and Elder and Lubotsky, 2009 on United States; Mühlenweg and Puhani, 2010 on Germany; Grenet, 2011 on France), and to a higher probability of ADHD diagnoses (Elder, 2010; Schwandt and Wuppermann, 2016). Furthermore, the evidence indicates that this initial disadvantage maps into worse labor market outcomes. Fredriksson and Öckert (2014) and Bedard and Dhuey (2012) find negative effects on employment and earnings in Sweden and United States.[2]

In the empirical analysis, we first document that in Spain younger children tend to perform worse in school than older children. Using data from four waves of the PISA Survey, we find that students who started school earlier are more likely to have repeated a grade and to have lower test scores in mathematics and reading at age 15 than their older peers. For example, students born in December (the youngest in their cohort) are 10 percentage points more likely to have repeated a grade at age 15 than those born in January (the oldest).[3] We go further and explore how this pattern translates into long-term outcomes. To do so, we use the information about parental characteristics registered in the Spanish birth certificates –and hence our results refer to the population who had a new born in 2007 to 2014. We find that people who started school earlier have less schooling, less educated partners and are less likely to be married.

The causal interpretation of the documented age effect requires that parents do not manipulate neither their child's 1) day of birth (by planning or postponing delivery after the birthday cutoff to entry school); or 2) the effective age of school entry (by postponing enrollment for one year). Some parents might be willing to do so if they are sufficiently concerned about the negative effects associated with the age at school entry. Spain enforces a strict birthday cutoff to entry school, so, even if willing, parents cannot opt for strategy 2). Though more costly,

2. Using Norwegian data, Black, Devereux, and Salvanes (2011) find that this age effect dilutes when people are 30 years old.

3. This pattern echoes the findings of Calsamiglia and Loviglio (2016) on Catalonia.

some parents could plan or delay delivery after the birthday cutoff to avoid their children being among the youngest in their classroom. Alternatively, there could be a connection between parental background and the timing of birth along the year –if, for example, richer parents prefer to have their children born during the summer. Such a pattern would break the independence between birthday and newborns' characteristics.

We analyze the birth certificates from the universe of newborns in Spain from 2007 to 2014 to study potential seasonality in births.[4] Using census-type data allows us to detect birth patterns that could go unnoticed in survey data given to a small sample size. We find that there is indeed some seasonality in births in Spain. However, and key for causal interpretation, we do not find significant differences in the characteristics of babies born in December and January (just before and after the birthday cutoff for entry to school, which is January 1st).

We, hence, focus the analysis on people born in January (the oldest at school entry) and December (the youngest). Using data from PISA, we show that the age of school entry effect is significantly greater among children from disadvantaged families. For instance, young students raised in a family with a low socioeconomic status are 12.7 percentage points more likely to have repeated a grade at age 15 than older students from the same socioeconomic background. This gap is only 4 percentage points among students from a high socioeconomic background.

To analyze whether such a difference is related to parental responses by family background, we assemble two different datasets with detailed information about parental investments: the two waves of the Spanish Time Use Survey (2003 and 2009, STUS) and the General Diagnostic Assessment (GDA), which has information about school characteristics. We find that college-educated parents increase their time investment and choose schools with better inputs when their children

4. 2007 is the first year in which parental characteristics are available in the birth certificates data.

are the youngest at school entry, while parents without a college education do not. Finally, we deepen our analysis by looking at gender differences. Here, we find that college-educated parents increase their investment when their (relatively young) children are boys.

Summing up, we use quasi-experimental variation to show that being the youngest at school entry has a negative effect on student outcomes and that this effect is greater among children from a disadvantaged background. We, then, document that parents with more education increase significantly more the time they spend helping their children with school activities and choose schools with better inputs when their child is among the youngest in her school cohort. So, parents from a higher socioeconomic background compensate for the side-effects of a widely used school policy that puts younger children at a learning disadvantage.

Our results highlight the importance of considering policy responses in the impact evaluation literature based on reduced-form estimates. The reduced-form effects of a policy includes both a direct (policy) effect and an indirect effect comprised of endogenous responses to the policy –in our case, the parental responses to the school-entry age (Todd and Wolpin, 2003). To disentangle policy effects and production function parameters, we need to understand the behavioral responses to policies. Surprisingly, there are few studies exploiting quasi-experiments that do this.

Specifically, we contribute to the emerging literature on parental reactions to school policies. In the closest study to ours, Fredriksson, Öckert, and Oosterbeek (2015) show that parents in Sweden spend more time helping their children with homework to compensate for larger class sizes. Regarding "positive" policies, Pop-Eleches and Urquiola (2013) and Das, Dercon, Habyarimana, Krishnan, Muralidharan, and Sundararaman (2013) find that parents reduce effort and monetary investments –respectively– in response to increases in school quality –in Romania– and school grants –in India and Zambia. In a recent paper, Albornoz et al.

(2016) develop a model that implies that parents compensate for lower educational quality.

We also contribute to the ample literature on the effects of age at school entry. Here, we document that the negative effect of starting school at an earlier age is greater among people from a disadvantaged background, as Bernardi, Grätz, and Jesper Sørensen (2015) show on England (and opposite to Elder and Lubotsky (2009) on United States). We provide evidence on a mechanism behind this result.

The rest of the paper is organized as follows. Section II. provides the institutional framework. Section III. presents the data and Section IV. the identification strategy. Section V. describes the results of age at school entry, and Section VI. the analysis of parental responses and the differences in these responses according to the child's age and gender. Section VII. concludes.

II. School-entry Age

II.A. Institutional Framework

Children in Spain must begin primary school in September of the calendar year of their 6th birthday. This is an inflexible rule, the birthday cut-off to enter school is January 1st and children are not allowed to postpone entry to primary school. Although it is not compulsory, almost every child attends kindergarten from September of the year of their third birthday.

Grade repetition is allowed and common. Spanish students can be obliged to repeat a grade once during primary education (grades 1-6) –although some exceptions apply for students with special needs, who can be retained twice. Students can repeat (both) Grades 7 and 8; though the total number of repeated years is limited to two in grades 1 to 8. Grade retention is a common practice in both

middle and primary school.[5] In fact, Spain is among the three OECD countries with the highest rates of repetition at the primary level (the others are France and Portugal). These countries have education systems without tracking by ability level (Eurydice, 2011). Thus, grade retention seems to be commonly used as a remedy for pupils in difficulty in primary and secondary education in Spain.

II.B. How Can School Entry Age Have Learning Effects?: Maturation and Before-School Experience

As age is a determinant of maturity, younger children might be less ready to acquire knowledge and, overall, to deal with the experience of formal schooling Dhuey (2016). Age at school entry could impact learning outcomes if, as it is common in Spain, all students are subject to the same curriculum and teaching strategies regardless of their levels of maturity or school readiness (Elder and Lubotsky, 2009). In this context, older students have the advantage of being able to absorb contents during the first school years because their higher maturity increases their learning capabilities. Moreover, because of their age, older students are more likely to have a higher stock of skills at school entry than their younger classmates, which should also help them to learn more in subsequent grades.

The relevance of achievement at school entry for shaping future outcomes might depend on the structure of the education system. For example, it is likely to be more important in countries that teach the same curriculum to all students independent of their achievement levels –as it is the case in Spain. The same story goes for contexts where retention is commonly used –such as Spain. Younger –and less mature– students might be more likely to repeat a grade, which might be detrimental to them if this is associated with negative stereotypes or the loss of self-esteem. The use of (rigid) tracking based on early achievement levels might

5. In Spain the retention probability at lower secondary is 31.9 %. In contrast, in Finland it is only 0.5 % (Eurydice, 2011).

put younger students in different educational trajectories –ones with access to fewer school inputs– than their older peers. Grenet (2011) gives a more complete discussion of how the structure of education systems can amplify initial differences in performance due to age at the school entry.

Summing up, their higher maturity and larger prior human capital at school entry, i.e. higher *school readiness*, would lead older students initially to perform better. If early learning is complementary to later learning (*dynamic complementarities*) such initial difference in learning outcomes could place early entrants at a permanent disadvantage.

III. Data

We exploit data from four different sources. We use data from the OCDE Programme for International Student Assessment (PISA) and Spanish birth certificates to analyze the short and long-term impacts of entrance age to school, respectively. The PISA data also allows us to look at socioeconomic differences in the effect of being younger at school. To analyze the potential mechanisms explaining these socioeconomic differences, we use two different surveys with information about parental investment in Spain: the 2009 General Diagnostic Assessment (GDA, Evaluación General de Diagnóstico) and the Spanish Time Use Survey (STUS). We use the first survey to study school characteristics and parental help with homework, and the second to study parental effort in monitoring, teaching and helping children with school-related tasks.

Our focus on parental time investment on child development is grounded in the literature which shows that parental time inputs are important for the cognitive development of their children, particularly when the child is young, while financial expenditure is less productive in terms of producing child quality (Del Boca, Flinn, and Wiswall, 2014).

Seasonality in births can vary across countries and because this is an important factor for our econometric strategy, we restrict the analysis in all datasets to the population born in Spain.

III.A. Programme for International Student Assessment

The Programme for International Student Assessment is an international survey that assesses the skills and knowledge of 15-year-old students. We use Spanish data from the waves 2003, 2006, 2009 and 2012 to analyze the relationship between age at school entrance and academic performance at age 15, and to study how this relationship varies by family background. In addition to test scores in mathematics and language, the survey has information on student socioeconomic characteristics: an index of economic, social and cultural status, parental education, and birthday among others.[6] Table XI shows the summary statistics of the analyzed sample.

III.B. Spanish Birth Certificates

We use micro data from Spanish birth certificates (from the Spanish National Statistical Institute) of the years 2007 to 2014. This database comes from a standardized form that families fill out at the time of birth registration; it has information for the whole universe of newborns in Spain every year. It not only has detailed information about the baby (birth-weight, method of delivery, gender, indicator of premature birth, among others) but it also includes parental demographic characteristics, as well as their month of birth. First, we use information regarding the parents to analyze the long-term effects of being an early-entrant to school. Second, we use this database to analyze whether there is a correlation between the month of birth and parental characteristics that could bias our

6. PISA 2006, 2009 and 2012 provide an optional questionnaire for parents, however it was not carried out in Spain.

analysis.

The data from Spanish birth certificates used in this paper covers the period 2007-2014. We start in 2007 because in this particular database parental education is available only from that year.. Tables XII and XIII show the summary statistics.

III.C. General Diagnostic Assessment

The Spanish Ministry of Education ran the General Diagnostic Assessment in 2009 with the purpose of evaluating the general competences of students in the 4th grade of primary education. It covers a representative sample of all students in 4th grade. 887 schools participated in the survey in which students took standardized tests in 4 subjects (mathematics, reading, science and civics). Parents, pupils and school principals also answered questionnaires. Our outcomes of interests are mainly those related to parental involvement in children's education. Using information on school characteristics (public or private school, how motivated are students and parents, and class size), we analyze parental involvement through school choice. We also use information on whether parents help their children with homework, whether they check student's homework and whether parents go to school meetings.

This survey includes information on student's birthday and we use mother's education (an indicator of whether the mother has a college education) as a proxy of household socioeconomic status. Table XV shows the summary statistics.

III.D. Spanish Time Use Survey

We use data from the two waves of the Spanish time use survey (2003 and 2009). Each survey includes a representative sample of the Spanish population. We use information from the diary of activities reported by all household members older than 10. Each household member older than 10 fills out a diary of activities,

reporting her activities across the previous 24 hours, at 10 minute intervals. They also report whether one child aged 0–9 or one adult from the household was present during the activity.

Our outcomes of interest are the time parents spent with children on the following activities: teaching, reading and playing, and other childcare activities. We also have information on individual's month of birth and mother's education (indicator of college mother). The sample analyzed includes households with children (individuals younger than 18). Table XIV shows the summary statistics.

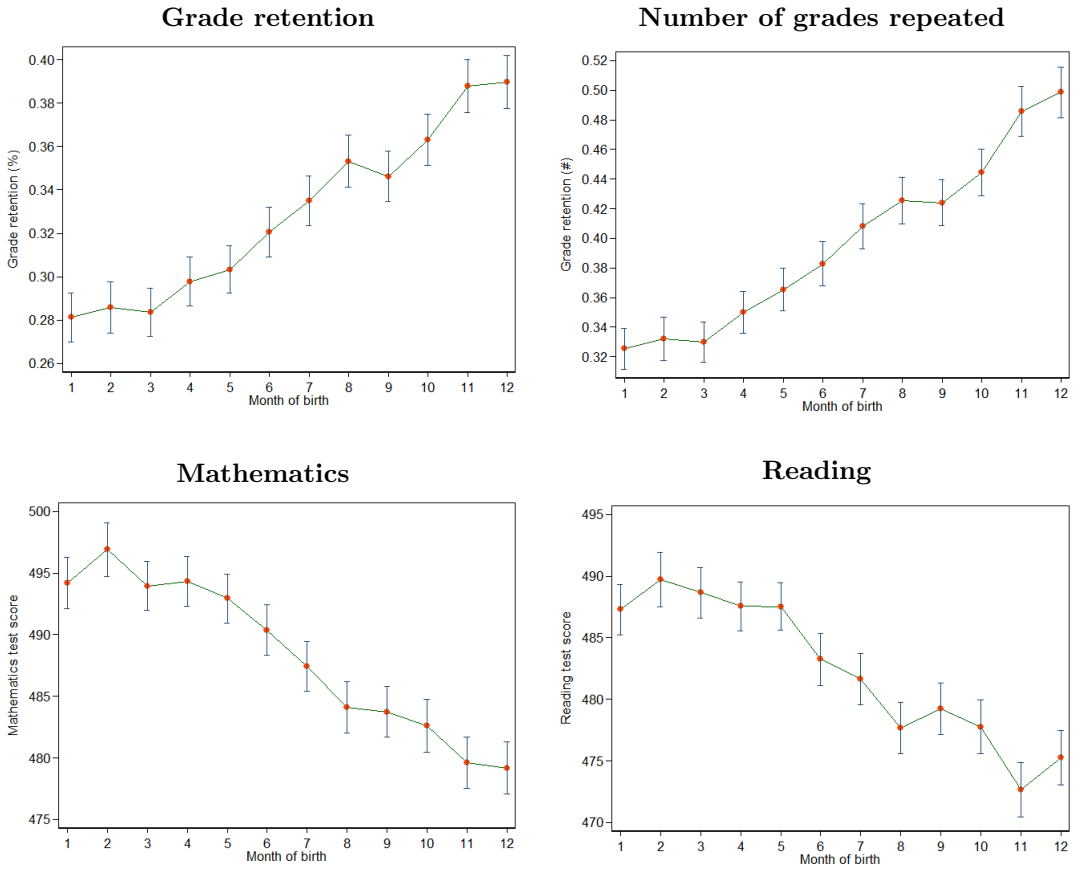
IV. Empirical Strategy

This section presents our empirical approach to analyze how the age at which children begin school affects their performance (at school and also in long-term outcomes), but more importantly, to study how parents react to this.

IV.A. Month of birth and short and long-run outcomes

We start by providing evidence on the relationship between month of birth and student outcomes in Spain. Using data from PISA, Figure I shows local means by month of birth of grade repetition and test scores at age 15. There is a clear monotonic relationship between these variables. People born later in the year –and hence younger at school entry– tend to have worse school performance, both in terms of grade repetition and test scores. The size of the differences in academic performance between the youngest and the oldest children is large, even in comparison to the widely analyzed gender and socioeconomic status gaps.

Figure I: **School Performance in Spain and Month of Birth**



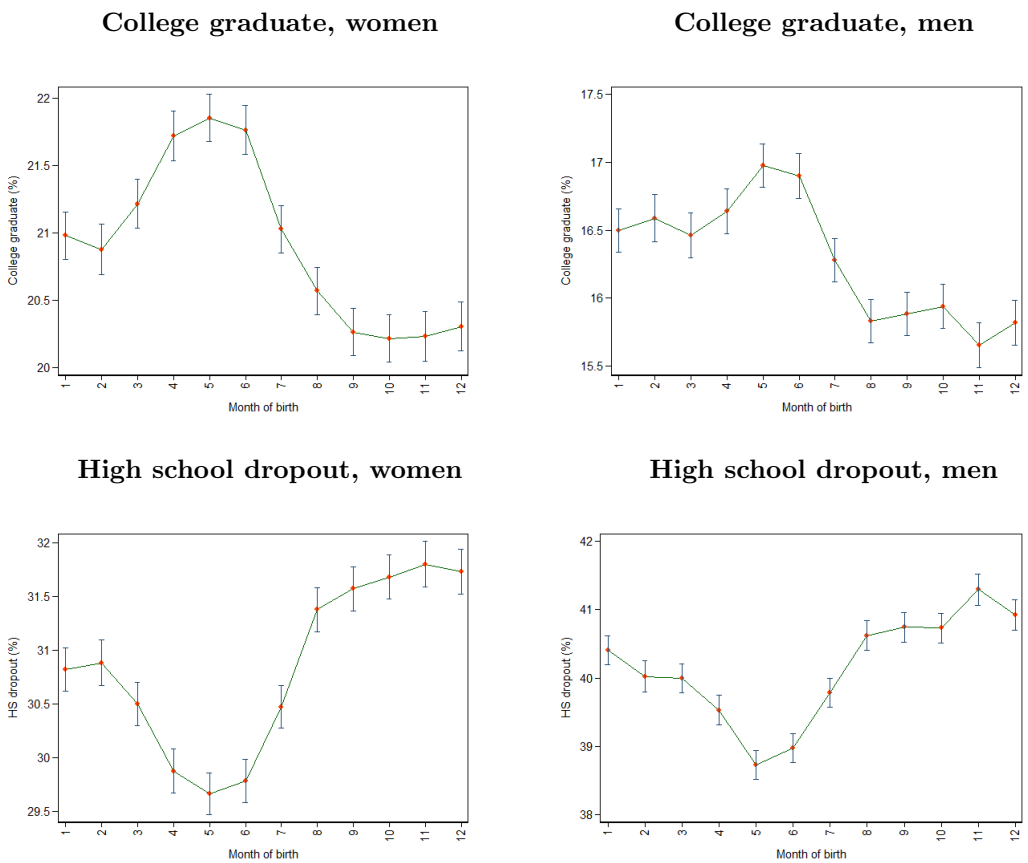
Notes: Data from Spanish students aged 15 assessed in PISA 2003, 2006, 2009 and 2012. The figures plot, by month of birth, the share of students who repeated at least one grade (figure on the top left corner), the means of the number of times a student repeated grades (figure on the top right corner), and the means of test scores in math and reading at PISA (figures on the bottom). Means are represented by red dots and 95% confidence intervals are in black.

We now take advantage of the information about parental characteristics included in the Spanish birth certificates to look at the long term effects of being an early-entrant to school. More precisely, we use micro data from Spanish birth certificates for the period 2007-2014 to show how educational, marital and labor market outcomes are related to month of birth.

Figure II shows local means by month of birth of the probability of having a college degree and of being a high school dropout. Results are presented separately for women and men. Still, people born later in the year have on average worse outcomes. But the relationship is not monotonic as in the student data. People

born around spring (May to June) tend to have better outcomes than others. This pattern is difficult to reconcile with a pure (relative) age effect –people born in May are younger than people born in January– and suggests the potential existence of seasonality in births. Before turning to explore such a pattern, we describe our econometric specification to clarify the discussion about the identification of the causal effect of age at school entry.

Figure II: **Long-term Outcomes: Month of Birth and Education Level**



Notes: Data comes from Spanish birth certificates (2007-2014). Population of father and mothers who had a new born in 2007 to 2014. Means with 95% confidence intervals. The figures plot, by month of birth, the share of college graduate women (figure on the top left corner), share of college graduate men (figure on the top right corner), share of high school dropout women (figure on the bottom left corner), and the share of high school dropout men (figure on the bottom right corner). Means are represented by red dots and 95% confidence intervals are in black.

IV.B. Econometric specification

Our identification strategy exploits the variation in age at school entrance generated by the combination of using a single birthday cutoff (1st of January) to regulate school entry and the fact that children are born throughout the whole calendar year. This means that children born after the birthday cutoff (e.g. January) are older at the moment of starting school than children born before the cutoff (e.g. December). With this relationship in mind, we write the following econometric model:

$$T_i = \alpha_0 + \beta_1 Young_i + \beta_2 College\, mother_i + \beta_3 Young_i * College\, mother_i + \beta_4 Girl_i + \epsilon_i \quad (1)$$

where T_i is a measure of school performance or effort/time investment made by parents of child i; $Young_i$ is a normalized scalar that indicates when individual i was born; and $College\, mother_i$ indicates whether individual i's mother has completed college. We also include other controls when using data from the STUS, as the date of the interview and household composition. Coefficients β_1 and β_3 are the parameters of interest and, respectively, indicate the effect of entrance age on the outcomes analyzed and how this effect interacts with mother's education.

The causal interpretation of coefficients β_1 and β_3 depends on the independence between age at school entry and the error term. There are two ways in which this condition could be broken. First, one might ask whether, concerned about the negative effects associated with age at school entry, some parents could manipulate the effective age of entry by postponing schooling over one year. This is not feasible in the Spanish context. Schools enforce a strict birthday cutoff to enter school so, even if willing, parents cannot opt for this. In other words, in Spain, children's predicted school entrance age according to their birthday equals their actual age at school entrance.

Second, there might be a connection between month of birth and parental

characteristics. This could happen either because some (concerned) parents may plan or postpone delivery after the birthday cutoff to enter school, or, more likely, if mothers with some characteristics are more likely to give birth in specific months of the year. In this case, the estimated effects of age at school entry would be confounded with birth seasonality. Buckles and Hungerman (2013) show that in the United States there is such a pattern. For instance, in the US, winter births are disproportionally among teenagers and the unmarried.

Finally, it is worth noticing that we do not include school fixed effects in our specification, unlike other studies on the effects of entry age on school performance. As we show in Subsection VI.B., school choice is one possible channel through which parents can respond to school unreadiness. Therefore, we avoid controlling for school characteristics because this is a choice variable.

IV.C. Seasonality of Births: Maternal Characteristics and Month of Birth in Spain

We use data from Spanish birth certificates to study potential seasonality in births and find that in Spain there is indeed a relationship between month of birth and maternal characteristics. Therefore, the comparison between children born in different months of the year could lead to a biased estimate of the causal impact if children born in different months are different for other reasons than the age at school entry.

Figure III displays the mean pre-natal characteristics of children born in each month from families of different backgrounds. As the figure shows, pre-natal characteristics of babies born in December are not different from those of babies born in January, independently of mother's education. The micro data from the Spanish birth certificates used in this analysis covers the years 2008-2009 and

2012-2014.[7]

Our identification strategy deals with the documented birth seasonality in two ways. First, we isolate the causal impact of age of school entry from seasonality in family background, by focusing our analysis only on within-season variation, more precisely by comparing the outcomes/parental investment of children born in winter: children born in December vs. children born in January.[8] Second, we are interested in the differential effects of age at school entry across children from different SES (proxied by mother's education). Therefore, on the assumption that the pure seasonal effects are the same for the two groups, the comparison of parental investment in children born in these two months between the two groups (children from university-educated mothers vs. children from lower educated mothers) would control for any remaining seasonality effect.

V. The Effects of Being the Youngest

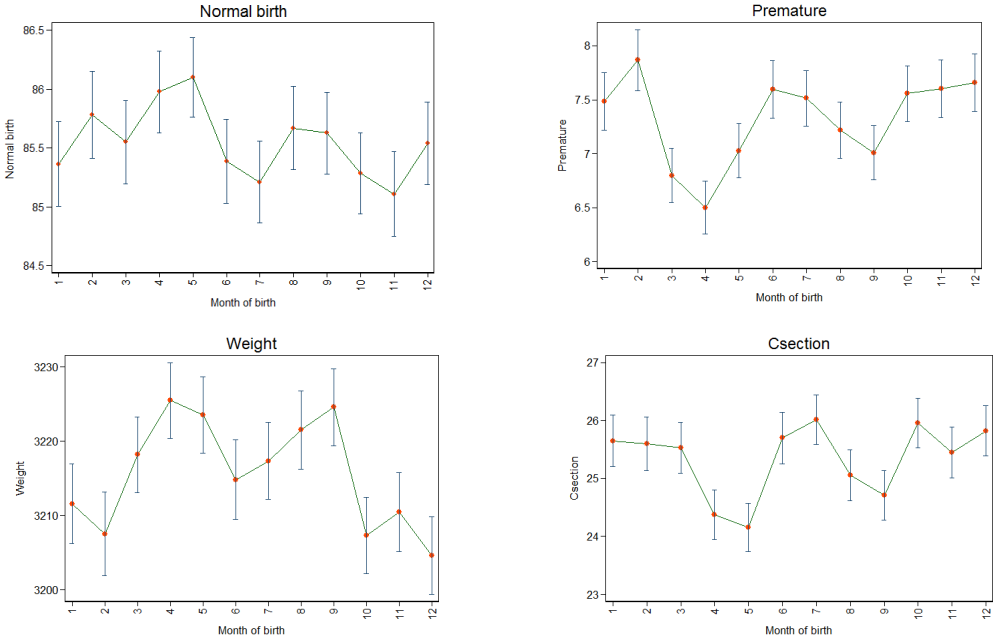
In this section, we present the reduced form effects of age at school entry on student and adult outcomes. Our main specification only includes individuals born in January or December to avoid problems related to birth seasonality in children and maternal characteristics. We examine, first, average effects on short and long-term outcomes, using data from PISA and the Spanish birth certificates, respectively. Then, in Subsection V.B., we analyze whether these effects vary by socioeconomic status.

7. We exclude 2010 and 2011 because, as shown in Borra, González, and Sevilla (2015), the fact that the Spanish 2,500-euro universal "baby bonus" was no longer paid to babies born after December 31st, 2010 meant that 2,000 families shifted their date of birth from January 2011 to December 2010, which makes these two years unrepresentative for the sample used in our analysis.

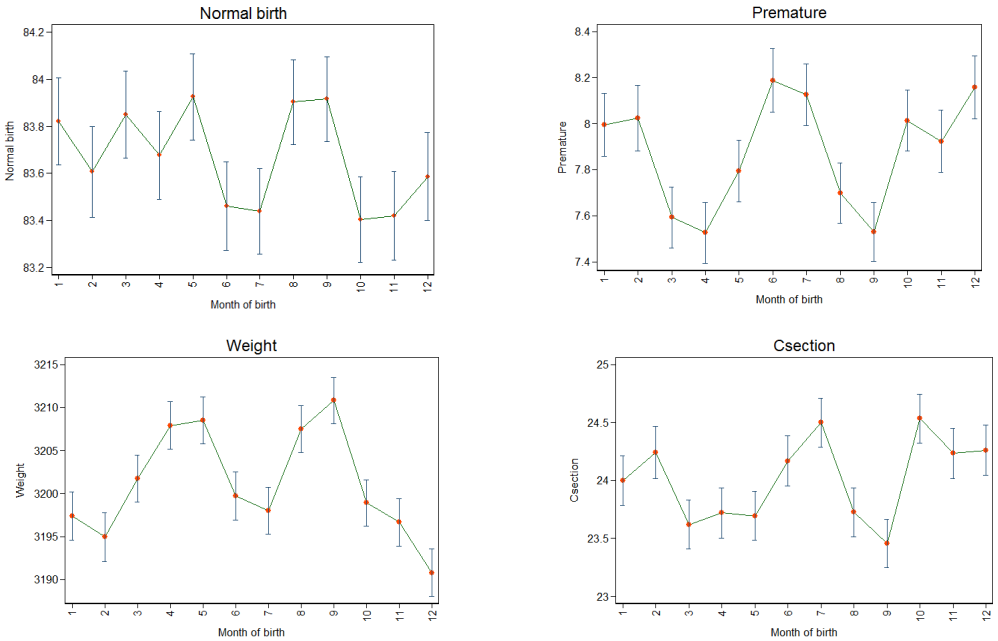
8. As robustness checks, we also run estimations based on a regression discontinuity approach that, after assuming a particular functional form for the month of birth, includes all children independently of their month of birth. Results are available upon request.

Figure III: Pre-natal Characteristics and Month of Birth

Children of mothers with college degree



Children of lower educated mothers



Notes: Data comes from Spanish birth certificates. Sample includes the universe of Spanish babies born from college graduate mothers (first four figures) or from lower educated mothers (last four figures) in the years 2008, 2009, 2012, 2013 and 2014. The figures plot, by month of birth, the percentage of normal deliveries, percentage of premature babies, the birth weight mean, and the percentage of babies born by cesarean. Y-axis shows values in % , except in the figure that shows mean weight in which the values are in grams. Means are represented by red dots and 95% confidence intervals are in black.

V.A. Poor Little Children: Short and Long-Term Effects of Being the Youngest

Table I presents the results of regressing several measures of school performance (grade retention, math and reading test scores) on an indicator of whether the student was born in December or in January, an indicator for being a female and an indicator for coming from a family with a high socioeconomic status (one in the top 25% of the distribution of the SES index). All regressions include vectors of dummies for year of birth and PISA survey year. Remember that the oldest children in the class are born in January ($Young = 0$) and the youngest children are born in December ($Young = 1$).

Table I: **Grade retention and test scores**

	Grade retention	Grades repeated	Math score	Reading score
	(1)	(2)	(3)	(4)
Young	0.105***	0.168***	-13.861***	-11.164***
	(0.008)	(0.011)	(1.440)	(1.433)
Female	-0.086***	-0.120***	-11.568***	34.421***
	(0.008)	(0.011)	(1.440)	(1.433)
Top 25% SES	-0.259***	-0.335***	59.506***	53.436***
	(0.009)	(0.013)	(1.654)	(1.646)
Constant	0.391***	0.472***	484.393***	456.509***
	(0.008)	(0.010)	(1.328)	(1.321)
N	12311	12311	12311	12311

Notes: Data from Spanish students aged 15 assessed in PISA 2003, 2006, 2009 and 2012. The outcome variables are indicators of school performance. Grade retention (column 1) indicates whether the student repeated a grade at least once, grades repeated (column 2) indicates the number of times s/he repeated a grade, and math and reading scores (column 3 and 4) represent the performance of the student in the PISA tests. "Young" is an indicator variable that equals one if the student was born in December and equals zero if s/he was born in January. All regressions include year dummies as control. Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01

In line with the visual evidence, younger students do worse in school than their older peers. The youngest children in their cohort are 10 percentage points more likely to have repeated a grade at age 15 than the oldest children (Column 1). This gap is similar to the gender gap in grade retention (see row 2 also in Column 1), and around 2/5 of the estimated gap for socioeconomic status (see row 3). A similar pattern arises for the total number of grades repeated at age 15. Students born in December repeat on average 0.17 school years more than students born in January (Column 2). In the same fashion, there is a clear age gap in student achievement measured by standardized test scores. The youngest students have on average lower test scores in mathematics (-13.8 points) and in reading (-11 points). All discussed results are statistically significant at the one percent level.

Table II presents the results of the long-term effects of being an early-entrant to school. The analyzed sample includes Spanish parents born in December and January. All regressions include birth cohort dummies, province dummies and year dummies.

Panel A of Table II shows the results for the sample of women, more precisely of Spanish mothers, observed at the time they gave birth. As before, women born later in the year tend to have worse schooling and marriage outcomes. Women born in December are 1.6 percentage points less likely to have a university degree, 2.2 percentage points more likely to be a high school dropout, 1.5 percentage points less likely to be married at the moment of giving birth, 1.4 percentage points less likely to have a college graduate partner, 2 percentage points more likely to have a high school dropout partner and 0.5 percentage points more likely to be a housewife. All results are statistically significant at the one percent level. A similar pattern is observed for males (results presented in Panel B of Table II).

Table II: **Long-term outcomes**

Panel A: Women

	College graduate	HS dropout	Married	Partner		Housewife
				College graduate	HS dropout	
	(1)	(2)	(3)	(4)	(5)	(6)
Young	-0.0163***	0.0224***	-0.0150***	-0.0136***	0.0202***	0.00538**
	(0.00185)	(0.00290)	(0.00376)	(0.00190)	(0.00233)	(0.00228)
N	430808	430808	448347	422205	422205	427923

Panel B: Men

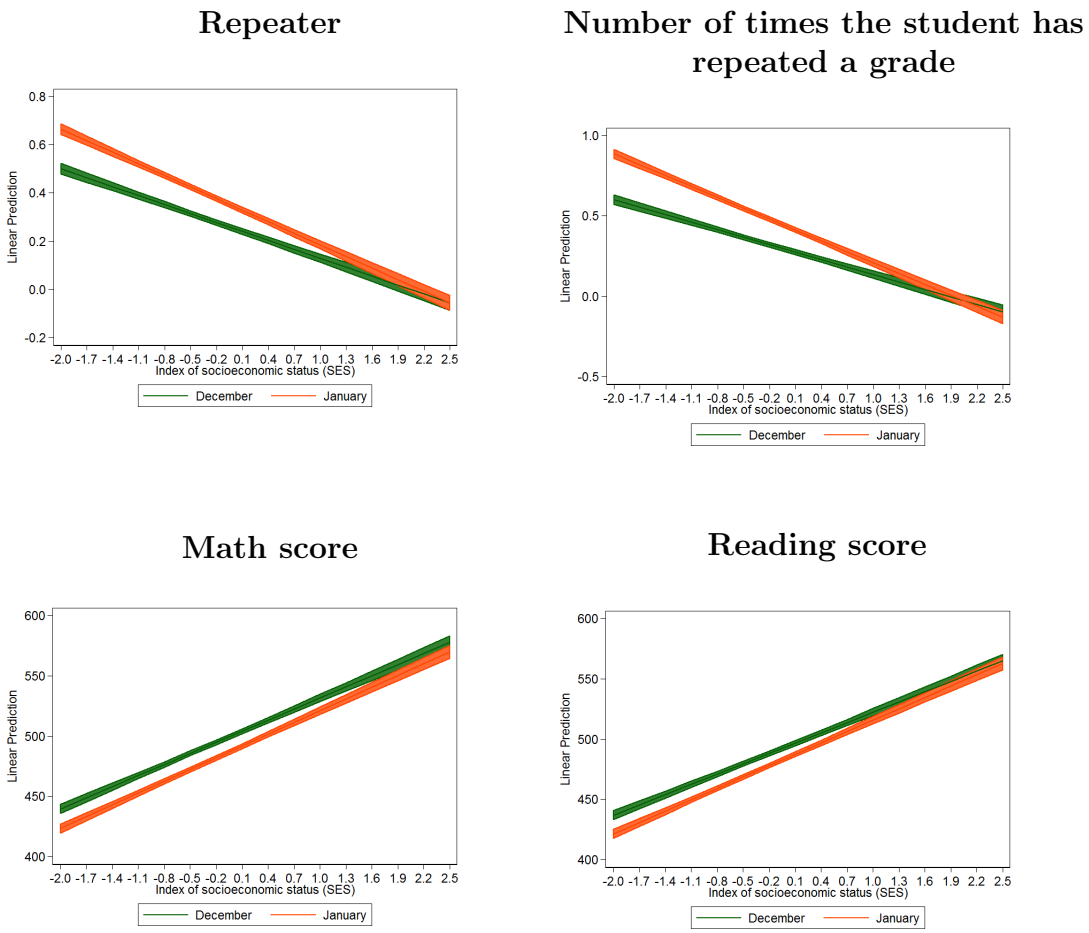
	College graduate	HS dropout	Married	Partner	
				College graduate	HS dropout
	(1)	(2)	(3)	(4)	(5)
Young	-0.0148***	0.0189***	-0.0151***	-0.0129***	0.0170***
	(0.00167)	(0.00296)	(0.00302)	(0.00159)	(0.00268)
N	394257	394257	407776	391096	391096

Notes: Data comes from Spanish birth certificates (2007-2014). Population of fathers and mothers who had a new born in 2007 to 2014, observed at the moment of their babies' birth. Sample includes Spanish individuals born in December and January. Panel A shows the results for the sample of women and Panel B for the sample of men. The outcome variables are indicator dummies of whether the individual is a college graduate (column 1 of each panel), whether she/he is a high school dropout (column 2), if she/he is married (column 3), whether her/his spouse is a college graduate (column 4) or a high school dropout (column 5) and, for the sample of women, whether she is a housewife (column 6 in panel A). "Young" is an indicator variable that equals one if the student was born in December and equals zero if s/he was born in January. All regressions include cohort dummies, province dummies and year dummies. Standard errors clustered at cohort level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

V.B. Socioeconomic Status and the Disadvantages of Being the Youngest: Poor (Poor) Little Children

Figure III shows how the negative effect of being the youngest gets significantly smaller the higher is the SES of Spanish students.

Figure IV: **School Performance in Spain: Young vs. Old by SES**



Notes: Data from Spanish students aged 15 assessed in PISA 2003, 2006, 2009 and 2012. The figures plot, for young (born in December) and old (born in January) students, the predicted marginal effect of socio-economic status on: the probability of having repeated at least one grade (figure on the top left corner), the number of grades repeated (figure on the top right corner), and the mean test score in math and reading at PISA (figures on the bottom). Point estimates and 95% confidence intervals.

Table III shows the results of regressing measures of school performance on an indicator of whether the student was born in December or in January, an indicator for being a female, an indicator for coming from a family in the top 25% of the distribution of the SES index, and an interaction term between these two indicators ($Young * top\,25\%$).

Table III: School performance, entrance age and socioeconomic status

	Grade retention	Grades repeated	Math score	Reading score
	(1)	(2)	(3)	(4)
Young	0.127***	0.206***	-16.439***	-13.754***
	(0.009)	(0.013)	(1.666)	(1.658)
Female	-0.086***	-0.120***	-11.553***	34.435***
	(0.008)	(0.011)	(1.440)	(1.432)
Top 25% SES	-0.215***	-0.259***	54.408***	48.317***
	(0.013)	(0.018)	(2.343)	(2.331)
Young * top 25% SES	-0.087***	-0.152***	10.153***	10.195***
	(0.019)	(0.025)	(3.306)	(3.289)
Constant	0.380***	0.452***	485.716***	457.837***
	(0.008)	(0.011)	(1.396)	(1.389)
N	12311	12311	12311	12311

Notes: Data from Spanish students aged 15 assessed in PISA 2003, 2006, 2009 and 2012. The outcome variables are indicators of school performance. Grade retention (column 1) indicates whether the student repeated a grade at least once, grades repeated (column 2) indicates the number of times s/he repeated a grade, and math and reading scores (column 3 and 4) represent the performance of the student in the PISA tests. "Young" is an indicator variable that equals one if the student was born inpuede December and equals zero if s/he was born in January. All regressions include year dummies as control. Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01

We find clear differences in the effect of age at school entry by socioeconomic background. Being young is significantly worse for the poor. Young students from a low socioeconomic background are 12.7 percentage points more likely to have repeated a grade at age 15 than older students from the same socioeconomic background (see row 1 in column 1). But, this age effect is significantly smaller for youth with a high socioeconomic background (12.7 - 8.7 = 4 percentage points). A, qualitatively, a similar argument can be made about the effects on the number of grades repeated and student achievement at age 15, as measured by test scores in math and reading. These results are statistically significant at the one-percent level.

In other words, the performance gap between high and low SES children is greater among those who enter school at a younger age. For example, youth born in January (the oldest in their cohort) from high SES parents are 21.5 percentage

points less likely to have repeated a grade at age 15 than children born in the same month from low SES parents (see row 2 in column 1). But, in the case of children born in December (the youngest in their cohort), such a socioeconomic gap is larger by 8.7 percentage points (see row 3). There is, again, a similar pattern for the effects on the number of grades repeated and test scores in mathematics and reading.

Hence, families from with a high socioeconomic status seem to buffer the negative effect of being relatively young on their children's outcomes, while those with a lower socioeconomic background do not. In Section VI. we discuss the mechanisms behind this result and analyze data on parental involvement in children's education to study whether parents respond differently to age at school entry depending on their SES.

VI. Parental Responses

Two channels could explain that entry age effects are greater among children from low SES families. First, high SES might actually be ready to start school irrespective of their age. Note that high SES children are likely more ready to start school than low SES children, because of the well-established correlation between family SES and pre-school investments. This explanation implies that what puts young children at a learning disadvantage is to be below a minimum level of achievement (maturity) the first day of school and that growing up in a more nurturing environment it makes more likely that even the youngest children are above this minimum level.

Second, high SES parents might increase their investments when their children are among the youngest at school entry to compensate for their learning disadvantage. This explanation is compatible with the idea that what puts a child at a disadvantage is her relative level of achievement with respect to her classmates.

Parents with higher SES are likely more prepared in terms of financial resources and information to invest in their children in reaction to a negative shock. The dominance of channel one implies that among high SES families, one should not observe differences in parental investment by the child's day of birth –age at school entry. The dominance of channel two implies the opposite. In this section, we analyze data on parental involvement in children's education to study whether parents respond differently to age at school entry depending on their SES.

We begin with the study of parental time investments using data from the Spanish Time Use Survey (STUS) and the General Diagnostic Assessment survey (GDA). Then, using also the second survey, we analyze whether parents choose schools with different inputs when their children are younger at school entry. Finally, we elaborate on whether parental responses vary according to the age and the gender of the children.

VI.A. Parental Time Investments

Our main estimates on parental time investment come from data from the two waves of the Spanish time use surveys. The STUS covers children aged 0 to 17 years old and reports detailed use of the time that parents spent participating in activities directly related to children's human capital development.

Table IV reports the estimated coefficients from Equation (1) using as outcomes measures of the time (in minutes) that parents spend teaching their children, reading and playing with them, and in other childcare activities. These coefficients provide the effects of age at school entrance on parental time investments and how such effects interact with family socioeconomic status (i.e. whether the mother has a college education or not).

In households with non-college educated mothers, entry age to school does not seem to affect parental time investments in activities related to children's

human capital development. The coefficient for being the youngest in the three regressions presented has a small magnitude and is not statistically significant at conventional levels. In contrast, households with university-educated mothers do spend significantly more time with their children on activities related to teaching (+ 5 minutes per day, significant at the five percent level) than their older peers from similar types of families. There are not statistically significant differences by children's month of birth in the time that highly educated parents spend on the other childcare activities. Thus, more educated parents compensate by investing more time in teaching activities when their children are among the youngest in their school cohort.

Table IV: Parental Time Investments

	(1) Teaching	(2) Read and Play	(3) Other childcare
Youngest	-0.145	0.798	-3.135
	(1.155)	(2.466)	(6.007)
College mother	1.103	13.55***	35.93***
	(1.511)	(3.560)	(8.641)
Youngest X College Mother	5.052**	-1.554	-1.151
	(2.560)	(4.670)	(11.22)
Observations	2196	2196	2196

Notes: Data from the Spanish Time Use Survey 2003 and 2009. Sample of children aged 0 to 17 born in December or January in Spain. The outcome variables indicate the minutes parents spent daily with their children doing different activities: those related to teaching (column 1), reading and playing (column 2), and other childcare activities (column 3). "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. All reported models include a vector of dummies for birth cohort, and quarter and day of interview. Standard errors are clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1

We complement these results with data from the General Diagnostic Assessment survey. Here, using self-reported statements, we analyze whether parents respond to entrance age by changing their behavior regarding helping children with their homework, checking their homework, or by attending to school meetings more frequently. As before, we examine whether the parental responses depend on maternal education.

Table V presents the estimated coefficients from Equation (1), in which the

outcome variables are indicators of different dimensions of parental involvement. As in the time use data, we do not find that households with non-college educated mothers invest differently if their children enter school at a younger age (first row of column 1); and, we do find differences in households with college-educated mothers. Children from university-educated mothers are significantly more likely to receive help to do their homework (+ 8 percentage points, significant at the 1 percent level) and to have their parents check their homework (+7.6 percentage points, significant at the five percent level) than their older peers from similar types of family (see coefficient of the interaction $Young * College\ mother$ in columns 1 and 2). It seems also more likely that their parents go to school meetings, although the effect is imprecisely estimated (column 3). Summing up, this evidence shows that more educated parents compensate for school unreadiness by putting more effort into helping their children with their homework.

Table V: Parental Involvement

	(1) Help with homework	(2) Parents check homework	(3) Parents go to school meetings
Youngest	0.00161	0.00642	-0.0140
	(0.0155)	(0.0174)	(0.0205)
College mother	0.0350*	-0.116***	-0.0411
	(0.0193)	(0.0258)	(0.0269)
Youngest X College mother	0.0795***	0.0757**	0.0497
	(0.0248)	(0.0347)	(0.0379)
Girl	-0.0129	0.0114	-0.0275*
	(0.0124)	(0.0161)	(0.0166)
Observations	3471	3328	3318

Notes: The data comes from the General Diagnostic Assessment survey of 2009. The sample includes Spanish students enrolled in 4th grade who were born in December or in January. The outcome variables are different measures of parental involvement in children's education: a variable indicating whether parents help their children with the homework (column 1), an indicator variable of parents checking children's homework (column 2), and a variable indicating whether parents frequently go to school meetings (column 3). "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. Standard errors are clustered at the school level. * p<0.10, ** p<0.05, *** p<0.01

VI.B. School Choice

We now analyze whether parents respond to entrance age by sending their children to different schools, and whether these reactions vary by maternal education.

We use data from the General Diagnostic Assessment survey. In this study, there is a module in which teachers report on the characteristics of the schools. More precisely, we have measures of teachers' perceptions about how active are the parents in the school, and how motivated are the students in the class. We also have information about class size and whether the school the student attends is public or private.

Table VI: School Choice

	(1) Public School	(2) Active Parents	(3) Class size	(4) Motivated peers
Youngest	-0.00569	0.00597	0.213	-0.0290
	(0.0193)	(0.0199)	(0.170)	(0.0202)
College mother	-0.219***	0.175***	1.320***	0.130***
	(0.0295)	(0.0302)	(0.273)	(0.0259)
Youngest X College mother	-0.0337	0.0622*	-0.641**	0.0715**
	(0.0361)	(0.0355)	(0.322)	(0.0317)
Girl	-0.0147	0.00385	0.116	-0.00997
	(0.0168)	(0.0169)	(0.136)	(0.0154)
Observations	3415	3425	3413	3405

Notes: The data comes from the General Diagnostic Assessment survey of 2009. The sample includes Spanish students enrolled in 4th grade who were born in December or in January. The outcome variables are different school characteristics: an indicator of public school (column 1), an indicator variable of whether the parents of student's classmates are very active, according to teacher's report (column 2), class size (column 3), and whether the teacher reports that the students of her class are very motivated (column 4). "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. Standard errors are clustered at the school level. * p<0.10, ** p<0.05, *** p<0.01

Table VI presents the coefficient estimates from Equation (1). In the first column, the outcome is an indicator variable on whether the student attends a public or a private school. Entry age does not significantly affect school choice in this specific feature, independently of mother's education. However, younger children with university-educated mothers are more likely to attend schools with very active parents (+ 6 percentage points, significant at the 10 percent level), smaller class sizes (- 0.6 students, significant at the five percent level) and very

motivated peers (+ 7 percentage points, significant at the five percent levels) than their older peers from similar types of family. In contrast, we do not observe significant differences in the characteristics of the schools attended by children from mothers without a college education (see first row in columns 1-4). Thus, we find that more educated parents are more likely to send their children to schools with better inputs when they must enter school at an earlier age.

Overall these results are consistent with the idea that more educated parents compensate when their children start school at an earlier age by spending more time helping their children with school and sending their children to schools with better inputs. Along the same lines, we do not find that less educated parents change their investment patterns in their children to compensate or reinforce the effects of entrance age. This socioeconomic difference in the compensating behavior helps to explain why the detrimental effect of being young at school entry is greater for children from disadvantaged backgrounds.

VI.C. Heterogeneity Analysis

VI.C.1. Parental Time Investments by Age

Using data from the Time Use survey, Table VII reports the estimated coefficients from Equation (1) for two age groups: children younger than 6, who are below school age at the moment of the survey, and children aged 6 to 17, who are above school entry age. If the results presented in Table IV, showing that young children with highly educated mothers spend more time with parents on activities related to teaching than their older peers, are driven by a mere age effect and not by what is going on in school (i.e. not by the negative early entry age effect), we might expect a similar pattern if we analyze the sample of children who are out of compulsory school. However, as shown in Table VII, the coefficient of the interaction *Young*College Mother* is not significantly different from zero when

estimated using the sample of children aged 0 to 5. Interestingly, the coefficient of this interaction becomes positive and significant when we analyze the sample of children who are above school entrance age, i.e. aged 6 to 17 (column 1 in the second panel of Table VII).

Table VII: Parental Time Investments by Age Groups

	Panel A: 0-5 years old		
	(1) Teaching	(2) Read and Play	(3) Other childcare
Youngest	-0.370	6.503	2.857
	(1.649)	(6.925)	(13.76)
College mother	1.642	16.19**	34.07**
	(2.173)	(7.169)	(15.49)
Youngest X College Mother	-1.957	-12.20	-12.43
	(2.983)	(10.01)	(21.46)
Observations	744	744	744

Panel B: Compulsory school-age children (6-17 years old)

	6-17 years old			6-17 years old, summer excluded		
	(1) Teaching	(2) Read and Play	(3) Other childcare	(4) Teaching	(5) Read and Play	(6) Other childcare
Youngest	-0.334	1.884	7.137	-0.677	3.415	7.248
	(1.495)	(2.080)	(4.587)	(1.846)	(2.206)	(5.192)
College mother	1.246	4.742*	10.23	0.274	5.205**	10.71
	(1.999)	(2.494)	(6.335)	(2.383)	(2.601)	(7.092)
Youngest X College Mother	9.911***	3.977	3.787	13.46***	2.069	4.136
	(3.711)	(4.062)	(8.731)	(4.524)	(4.574)	(9.624)
Observations	1452	1452	1452	1119	1119	1119

Notes: Data from the Spanish Time Use Survey 2003 and 2009. Sample of children aged 0 to 17 born in December or January in Spain. Panel A includes only children younger than 6 and Panel B includes compulsory school-age children (6-17 years old). The outcome variables indicate the daily minutes parents spent with their children doing different activities: those related to teaching, to reading and playing, and other childcare activities. "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. All reported models include a vector of dummies for birth cohort, and quarter and day of interview. Standard errors are clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1

The youngest children from households with university-educated mothers spend 10 minutes daily more with their parents on activities related to teaching than their older peers. The effect becomes even larger when we exclude the summer of the sample of children 6 to 17 years old, which reinforces the idea that such parental reactions are driven by what is going on in school: more educated parents compensate for school unreadiness by investing more time in teaching activities with their young children.

Once more, we observe that in households with lower educated mothers entry

age does not seem to affect parental time investments in activities related to children's human capital development.

VI.C.2. Gender Differences

Finally, we analyze whether the different responses among higher and lower educated parents depends on the gender of the student.

Using data from the General Diagnostic Assessment, Table VIII shows, separately by gender, the results of our analysis concerning whether parents respond to early entrance age by changing their involvement in children's education. Results show that the differential compensating effect found before is mainly present in male students: more educated parents of young boys compensate for school unreadiness by increasing their involvement in children's education.

Table VIII: Parental Involvement by Student Gender

	Panel A: Boys		
	(1) Help with homework	(2) Parents check homework	(3) Parents go to school meetings
Youngest	-0.0369	-0.0146	-0.0447*
	(0.0227)	(0.0249)	(0.0270)
College mother	0.0255	-0.0979***	-0.0848**
	(0.0241)	(0.0347)	(0.0373)
Youngest X College mother	0.101***	0.0961**	0.119**
	(0.0329)	(0.0479)	(0.0533)
Observations	1750	1675	1671
	Panel B: Girls		
	(1) Help with homework	(2) Parents check homework	(3) Parents go to school meetings
Youngest	0.0396*	0.0259	0.0165
	(0.0225)	(0.0242)	(0.0299)
College mother	0.0432	-0.138***	0.00871
	(0.0297)	(0.0377)	(0.0386)
Youngest X College mother	0.0598	0.0612	-0.0248
	(0.0368)	(0.0497)	(0.0523)
Observations	1721	1653	1647

The data comes from the General Diagnostic Assessment survey of 2009. The sample includes Spanish students enrolled in 4th grade who were born in December or in January. Panel A analysis the sample of boys and Panel B the sample of girls. The outcome variables are different measures of parental involvement in children's education: a variable indicating whether parents help their children with the homework (column 1), an indicator variable of parents checking children's homework (column 2), and a variable indicating whether parents frequently go to school meetings (column 3). "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. Standard errors are clustered at the school level. * p<0.10, ** p<0.05, *** p<0.01

Thus, the results show that entry age does not affect parental effort in a household with lower educated mothers, independent of the gender of the students.

However, young boys with university-educated mothers receive significantly more help with homework (+10 percentage points), their parents check their homework more frequently (+9.6 percentage points), and their parents are also more likely to go to school meetings (+12 percentage points), than their older peers from similar types of family. On the other hand, the point estimates for the sample of girls are smaller although imprecisely estimated (second panel of Table VIII).

Table IX: Parental Time Investments by Student Gender

	Boys			Girls		
	(1) Teaching	(2) Read and Play	(3) Other childcare	(4) Teaching	(5) Read and Play	(6) Other childcare
Youngest	-1.234	2.038	-4.306	-0.0714	4.750	18.82***
	(2.803)	(3.058)	(8.433)	(2.459)	(3.092)	(5.965)
College mother	-4.706*	7.605*	3.502	5.334	2.782	18.18**
	(2.812)	(4.203)	(10.72)	(3.687)	(3.039)	(9.170)
Youngest X College Mother	20.01***	0.865	20.41	6.753	3.344	-12.28
	(6.721)	(6.655)	(14.95)	(5.737)	(5.916)	(12.91)
Observations	561	561	561	558	558	558

Notes: Data from the Spanish Time Use Survey 2003 and 2009. Sample of children aged 6 to 17 born in December or January in Spain. First 3 columns correspond to the analysis of the sample of boys and the last 3 to the sample of girls. The outcome variables indicate the daily minutes parents spent with their children doing different activities: those related to teaching, to reading and playing, and other childcare activities. "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. All reported models include a vector of dummies for birth cohort, and quarter and day of interview. Standard errors are clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1

We find similar results using the Spanish time use surveys. Table IX shows that young boys from households with university-educated mothers spend significantly more time with their parents on activities related to teaching (+ 20 minutes every day) than their older male peers from similar types of family. There are not significantly differences in the responses of parental time investment to school unreadiness in the case of boys in households with lower educated mothers. In the case of girls, the coefficient of $Young{*}Collegemother$ is not statistically significant in any of the 3 regressions (columns 4 to 6). However, there is a parental reaction to entrance age in terms of non-educational time devoted to girls (column 6), that is not different for higher and lower educated parents.

Table X: School Choice by Student Gender

	Panel A: Boys			
	(1) Public School	(2) Active Parents	(3) Class size	(4) Motivated peers
Youngest	-0.0164	0.0230	0.329	-0.0268
	(0.0262)	(0.0288)	(0.242)	(0.0290)
College mother	-0.187***	0.138***	1.117***	0.106***
	(0.0379)	(0.0388)	(0.388)	(0.0351)
Youngest X College mother	-0.0715	0.0623	-0.797*	0.0920**
	(0.0490)	(0.0497)	(0.457)	(0.0456)
Observations	1722	1728	1724	1717
	Panel B: Girls			
	(1) Public School	(2) Active Parents	(3) Class size	(4) Motivated peers
Youngest	0.00445	-0.00973	0.107	-0.0307
	(0.0273)	(0.0278)	(0.262)	(0.0291)
College mother	-0.258***	0.219***	1.558***	0.158***
	(0.0404)	(0.0415)	(0.279)	(0.0346)
Youngest X College mother	0.0106	0.0529	-0.534	0.0467
	(0.0521)	(0.0505)	(0.406)	(0.0459)
Observations	1693	1697	1689	1688

Notes: The data comes from the General Diagnostic Assessment survey of 2009. The sample includes Spanish students enrolled in 4th grade who were born in December or in January. Panel A analyses the sample of boys and Panel B the sample of girls. The outcome variables are different school characteristics: an indicator of public school (column 1), an indicator variable of whether the parents of student's classmates are very active, according to teacher's report (column 2), class size (column 3), and whether the teacher reports that the students of her class are very motivated (column 4). "Young" is an indicator variable that equals one if the student was born in December and equals zero if she was born in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. Standard errors are clustered at the school level. * p<0.10, ** p<0.05, *** p<0.01

More educated parents also respond to entrance age by sending their young sons to schools with better inputs. Table X shows that the youngest boys with university-educated mothers go to schools with smaller class sizes (-0.8 students) and more motivated peers (+11 percentage points) than their older male peers from similar families. Regarding girls and children from households with lower educated mothers, we observe no significant differences in the characteristics of the schools attended by the youngest and the oldest students in these groups.

Summarizing, more educated parents compensate for the disadvantaged faced by their early entrants sons (i.e. school unreadiness) by increasing monitoring,

helping them with homework, spending more time in teaching-related activities and by sending their young sons to what are presumably better schools. On the other hand, lower educated parents and parents of girls do not change their effort (time investment) or school choice as a reaction to the effects of entrance age.

VII. Conclusions

To understand inequality in human capital it is key to understand how parental investment varies by socioeconomic status. Our results contribute to this goal by providing evidence on how parents react to a widely used school policy that puts younger children at a learning disadvantage and showing that parental responses vary with socioeconomic status.

Highly-educated parents compensate when their children enter school at an earlier age by spending more time helping their children with learning activities and choosing for them schools with better inputs. We do not find a similar pattern among less educated parents. This socioeconomic difference in compensating behavior could explain why the disadvantage of being young at school entry is greater for children from disadvantaged backgrounds. Interestingly, the response of highly educated parents is particularly present in the case of boys.

There is a well-established empirical relationship between parental socioeconomic status and student (and longer-term) outcomes. Genetics and differences in (planned) investment paths play are likely to play a key role in this. Our results highlight one additional channel: differences in investments due to different responses by parental background to policies that put children at a disadvantage. In other words, we find evidence that more educated parents are more prepared to handle the side effects of policies and can then protect their children from this adverse effects by increasing the resources they allocate to them.

Our findings call for the design of public policies targeting those who need support the most, presumably with a focus not only on the children, but also on their parents.

The results presented in this paper are also informative about the effects of teaching the same curriculum to children with different achievement levels. This policy is common across developed and developing countries. Our findings suggest

that the task of dealing with a unique curriculum from the position of a learning disadvantage can be particularly daunting for children from a disadvantaged background. Policies targeted to allow schools to teach at the right level (using some degree of tracking or supplementary activities by achievement level) are worth exploring.

Tables: Summary Statistics

Table XI: Programme for International Student Assessment: Summary Statistics

	(1) Difference	(2) December	(3) January
Girl	0.01	0.51	0.50
	(0.01)		
Repeater	0.08***	0.32	0.24
	(0.01)		
Times repeated	0.12***	0.41	0.28
	(0.01)		
Math	-13.44***	492.41	505.85
	(1.51)		
Reading	-12.45***	484.79	497.24
	(1.52)		
Observations	12349		

Notes: Data from Spanish students aged 15 assessed in PISA 2003, 2006, 2009 and 2012. Repeater is an indicator variable of whether the student repeated a grade at least once, times repeated indicates the number of times she repeated a grade, and math and reading scores represent the performance of the student in the PISA tests. Column 1 reports means and the standard errors, in parenthesis, for a t-test on the equality of means in columns 2 and 3. *** p<0.01, ** p<0.05, * p<0.1

Table XII: Spanish Birth Certificates: Summary Statistics. Sample of Women (Mothers)

	(1) Difference	(2) December	(3) January
Year	0.047***	2010.392	2010.345
	(0.007)		
College	-0.007***	0.202	0.208
	(0.001)		
HS dropout	0.008***	0.325	0.317
	(0.001)		
Married	-0.004**	0.644	0.648
	(0.001)		
Parther with college	-0.005***	0.160	0.165
	(0.001)		
HS dropout partner	0.004**	0.409	0.405
	(0.002)		
Housewife	-0.000	0.182	0.182
	(0.001)		
Observations	448347		

Notes: Data from Spanish birth certificates (2007-2014). Population of mothers who had a new born in 2007 to 2014, observed at the moment of their babies' birth. Sample includes Spanish individuals born in December and January. The variables are indicators dummies of whether the individual is a college graduate, whether she is a high school dropout, if she is married, whether her spouse is a college graduate or a high school dropout and whether she is a housewife. Column 1 reports means and the standard errors, in parenthesis, for a t-test on the equality of means in columns 2 and 3. *** p<0.01, ** p<0.05, * p<0.1

Table XIII: Spanish Birth Certificates: Summary Statistics. Sample of Men (Fathers)

	(1) Difference	(2) December	(3) January
Year	0.029***	2010.361	2010.332
	(0.007)		
College	-0.007***	0.158	0.165
	(0.001)		
HS dropout	0.005***	0.409	0.404
	(0.002)		
Married	-0.006***	0.663	0.669
	(0.001)		
Parther with college	-0.008***	0.203	0.210
	(0.001)		
HS dropout partner	0.008***	0.318	0.310
	(0.001)		
Observations	407776		

Notes: Data from Spanish birth certificates (2007-2014). Population of fathers who had a new born in 2007 to 2014, observed at the moment of their babies' birth. Sample includes Spanish individuals born in December and January. The variables are indicators dummies of whether the individual is a college graduate, whether he is a high school dropout, if he is married, and whether his spouse is a college graduate or a high school dropout. Column 1 reports means and the standard errors, in parenthesis, for a t-test on the equality of means in columns 2 and 3. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table XIV: Spanish Time Use Surveys 2003 and 2009: Summary Statistics

	(1) Difference	(2) December	(3) January
Girl	-0.00	0.49	0.50
	(0.02)		
College mother	-0.04	0.35	0.38
	(0.02)		
Teaching	1.33	8.14	6.80
	(1.04)		
Read and play	-0.95	22.09	23.05
	(2.22)		
Other childcare	-5.26	81.00	86.26
	(4.93)		
Observations	2275		

Notes: Data from the Spanish Time Use Survey 2003 and 2009. Sample of children aged 0 to 17 born in December or January in Spain. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. The other variables indicate the daily minutes parents spent with their children doing different activities: those related to teaching, reading and playing, and other childcare activities. Column 1 reports means and the standard errors, in parenthesis, for a t-test on the equality of means in columns 2 and 3. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table XV: General Diagnostic Assessment: Summary Statistics

	(1) Difference	(2) December	(3) January
Girl	-0.03	0.48	0.51
	(0.02)		
College mother	-0.01	0.29	0.30
	(0.02)		
Parents help with homework	-0.03*	0.84	0.86
	(0.01)		
Parents check homework	-0.03*	0.73	0.76
	(0.01)		
Parents go to school meetings	0.00	0.64	0.64
	(0.02)		
Public school	0.02	0.61	0.59
	(0.02)		
Parents go to school meetings (School report)	-0.02	0.48	0.50
	(0.02)		
Class size (School report)	-0.07	23.87	23.94
	(0.14)		
Motivated peers (School report)	0.01	0.70	0.69
	(0.02)		
Observations	3514		

Notes: The data comes from the General Diagnostic Assessment survey of 2009. The sample includes Spanish students enrolled in 4th grade who were born in December or in January. The variable "college mother" assumes the value 1 if the mother of the student has a college degree and zero otherwise. The rest of the variables are different measures of parental involvement in children's education: "Parents help with homework" is an indicator of whether parents usually help their children with the homework, "Parents check homework" an indicator of parents checking children's homework, "Parents go to school meetings" a variable indicating whether parents frequently go to school meetings, "Public school" indicates whether the child goes to a public school, "Parents go to school meetings (School report)" is an indicator variable of whether the parents of student's classmates are very active, according to teacher's report, class size indicates the number of students in the class, and "Motivated peers (School report)" indicates whether the teacher reports that the students of her/his class are very motivated. Column 1 reports means and the standard errors, in parenthesis, for a t-test on the equality of means in columns 2 and 3. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

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