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ABSTRACT

The Cost of Grade Retention*

This paper uses administrative longitudinal micro data on Junior High school students in Uruguay to measure the effect of grade failure on students' subsequent school outcomes. Exploiting the discontinuity induced by a rule establishing automatic grade failure for pupils with more than three failed subjects, I show that grade failure leads to substantial drop-out and lower educational attainment even four to five years after grade failure first occurred.

JEL Classification: I21, I22 and J20
Keywords: grade retention, regression discontinuity and school drop-out

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Grade repetition in school is common in less developed countries, and often accompanied by low enrollment and high drop-out rates, the combination of the two often referred to as 'wastage'.

Figure 1 plots gross enrollment rates in secondary school over grade repetition rates in primary school in 65 countries.[1] Sub-Saharan Africa shows both the lowest enrollment rate (31%) and the highest repetition rate (around 20%). At the other end of the spectrum, Central Asia, Eastern and Western Europe and North America display repetition rates that vary between 1% and 2% and enrollment rates that vary between 86% and 112%. Latin America, North-Africa, the Middle East and South East Asia locate somewhere halfway - with repetition rates between 6% and 9% and enrollment rates between 62% and 73% (on Latin America see also Urquiola and Calderon, 2006). Figure 2 also shows that repetition tends to be negatively associated with low levels of income per-capita.

Do the hurdles that repetition creates for students' transition through the school system explain why a large fraction of students eventually drop out? Or is the correlation in Figure 1 spurious, due for example to the circumstance that where the demand for education is low, the efficiency of the system, measured by grade promotion, is also low, perhaps due to low public investment in education? Do poor teachers and schools' quality, teachers' absenteeism, lack of school infrastructures - often cited as major problems of school systems in developing countries - explain both high repetition rates and students' incentives to abandon the system?[2] Or do students in these countries find it harder to progress through the system due to lack of financial resources, a higher opportunity cost of attending school or malnutrition, hence leading to both repetition and drop-out?

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[1] Data come from UNESCO (2002) and refer only to those countries that report positive repetition rates. Although the U.S.A. Department of Education does not provide official figures on repetition, estimates (not in the figure) from the CPS show that around 12% of individuals aged 12-15 have repeated at least a grade (Cascio, 2005).

[2] On teachers' absenteeism in Indian schools see Banerjee and Duflo (2006), Chaudhury et al. (2005). On the effect of the supply of schools on enrolment see Duflo (2001).

The desirability of grade retention is a controversial issue. This reflects a substantial disagreement on whether grade repetition is beneficial to students and the society at large, and more fundamentally the circumstance that there are both costs and benefits associated to this policy.

Although not undisputed (Alexander, 2003), there is a view among psychologists and part of the pedagogical profession that early grade repetition does not lead to improvements in school achievement (McCoy and Reynolds, 1999), while raising drop-out (Jimerson et al, 2002), with negative socio-emotional consequence (Jimerson et al., 1997). Low self-esteem, due to disenfranchisement or stigmatization, low expectations on the part the environment, or the cost of readjusting to a new class and possibly a new teacher, might worsen a student's outcomes and eventually result in drop-out.

A different view emphasizes the benefits of grade repetition, as, according to this view, this might reinforce a student's knowledge or discipline, with potential beneficial effects on subsequent outcomes. Additional exposure to teaching, especially in early grades, might make a student more apt, and hence presumably more likely, to pursue higher levels of education. Repetition might also improve the quality of the match between the school and the student if his development makes him more apt to attend a certain grade at a later age, or if changing peers and teachers leads to an increase in productivity. According to this view, grade repetition is an efficient mechanism to reallocate students to classes.

Possibly, the strongest argument in favor of grade repetition is that it acts as a deterrent against poor school performance. By inflicting a high penalty to underperformers, this policy creates an incentive to increase effort (see Jacob, 2005, on the incentive effect of high stakes exams on students' outcomes), although this might come at a cost, since students take longer to transition through the system. Experiencing the penalty of repeating a grade might also make repeaters less likely to wanting to experience this again, hence creating an incentive to improve school performance, possibly because of learning or the increasing marginal cost of repeating an additional grade.

Although there is a rather copious body of research on the determinants of grade repetition, convincing quasi-experimental evidence on its effects is scarce, especially for developing countries.[3] The main difficulty in identifying the effect of grade failure on subsequent school outcomes is that latent school outcomes - i.e. the ones which would be observed in the absence of grade failure - and the propensity to fail a grade are likely to be simultaneously determined. Similar to the spurious cross-country correlation discussed above, characteristics of the pupil - such as his ability or motivation - of his teachers, school and environment are likely to affect simultaneously grade failure, stay-on rates and attainment. Such correlations will likely overestimate the impact of grade failure on subsequent school outcomes.

There papers, all for the U.S.A., account explicitly for the potential endogeneity of failure rates. Jacob and Lefgren (2004, 2009) use the discontinuous relationship between test scores and promotion to assess the casual impact of grade repetition on achievement among Chicago public school students. Their results show a positive short-term effect of grade retention on third graders' achievement and no effect on sixth graders'. They also show that grade retention in eight (but not in sixth) grade leads to an increase in drop-out and a fall in the probability of high school completion. Using the variation in age of entry into kindergarten across States as an instrument for repetition, Eide and Showalter (2001) conclude that, for white students, grade repetition leads to lower drop-out and higher earnings, although results are not statistically significant.

[3] Evidence on the determinants of grade repetition illustrates a causal effect of family socio-economic status (Oreopoulos et al., 2006 for evidence on parental education, Maurin and Goux, 2005, for evidence on residential overcrowding), educational inputs (Pischke, 2003, for evidence on the length of the school year) and early childhood interventions (Currie and Neidel, 2007, for evidence on Head Start), and grade retention (often measured as accumulated age-grade distortion). For less developed countries, there is evidence that family background and school inputs are important determinants of grade failure (Gomes-Neto and Hanushek, 1994, for Brazil and Patrinos and Psacharopoulos, 1996, for Bolivia and Guatemala). Evidence from Colombia based on a randomized school voucher program illustrates the positive effect of increased school choice and the ability to afford private education on promotion rates (Angrist et al., 2002). Conditional and unconditional cash transfers also appear to have a positive effect on grade promotion (Behrman et al., 2001, Schady and Araujo, 2008).

In order to circumvent the identification problem highlighted above, in this paper I suggest using a rule in force in secondary Junior High school (grades 7 to 9) in Uruguay - a country with remarkably high repetition rates - that establishes automatic grade failure for pupils with more than three failed subjects at the end of the school year. I exploit the discontinuity in grade advancement induced by this rule to assess the causal impact of grade failure on drop-out and school attainment later in life. I find that grade failure induces students to drop-out at the end of the school year when failure occurs, with long lasting effects on attainment.

The structure of the paper is as follows. Section I provides background information on the Uruguayan school system. Section II presents the data, Section III discusses the specification and identification of the regression model. Section IV presents the regression results and Section V concludes.

I. THE SCHOOL SYSTEM IN URUGUAY: BACKGROUND

Uruguay boasts a long tradition of publicly provided education and social inclusion. Primary school was made compulsory in 1877, universal primary schooling was achieved in the 1950s and the literacy rate is among the highest in the region (97% for men and 98% for women).

The school system is organized into three basic cycles: Primary (grades 1-6), Junior High (grades 7-9) and Senior High (grades 10-12). Both Primary and Junior High schooling are compulsory.[4] Junior and Senior secondary education are offered in both *Liceos*, i.e. non-vocational secondary schools, and in vocational colleges, *UTU*s (*Universidad del Trabajo del Uruguay,* literally the Uruguayan Employment University).[5]

[4] Minimum working age over the period of analysis was 14, hence lower than the minimum age required to complete compulsory education.

[5] As of 2001, enrolment in vocational Junior High schools accounted for around 11% of overall enrolment in public Junior High (*Consejo de Educación Técnico Professional*, 2005). Not dissimilar from many other Latin American countries, private fee-based education is common, covering about 15% of secondary school enrolment.

Even if Uruguay still ranks high in terms of educational outcomes compared to the rest of Latin America, its education system is not problem-free.[6] While enrollment in primary school is timely and completion of primary education almost universal, the system is unable to retain a large share of students in Junior High (Da Silveira and Queirolo, 1998, Furtado, 2003, Bucheli and Casacuberta, 2000).[7]

One of the hurdles that students face during their progression through the school system is the high probability of failing a grade.[8] Grade progression in the Uruguayan system depends on the students' performance during the school year that runs from March to December.[9] For each of the taught subjects (between nine and eleven, depending on the school grade), students are assigned a score on a scale 1 to 12.[10] Students pass a subject if the associated score is no lower than 6. Those who fail a subject must eventually sit for remedial exam sessions. The first opportunity to retake an exam is just before the beginning of the subsequent school year, in February, and subsequent re-take exams take place in July and December of each year.

A necessary condition for promotion to the next grade is that the student has no more than three accumulated failed subjects by the beginning of the following school year (i.e. after the February re-take session). Accumulated fails include both failed subjects in the current school year and subjects

[6] Between 1960 to 2000, for example, average education in the population over 25 in the U.S.A. rose by around 4.5 years (from 8.7 to 12.2), while in Uruguay this growth was on the order of 2.1 years (from 5.1 to 7.2) (Barro and Lee, 2001).

[7] Data from a module of the 2001 National Household Survey (*Encuesta Continua des Hogares*) show for example that only around 80% of 24-29 year-olds declare having at one point started Junior High and, among these, 16% declare not having completed it. Starting from the mid 1990s and in recognition of these problems a reform of the educational system has taken place (ANEP, 2000). This includes, among other things, an additional year of compulsory pre-primary education for five years old.

[8] In the rest I focus specifically on grade failure, i.e. the requirement to attend again a certain grade in order to progress further. This is different from repetition (or grade retention), i.e. the actual re-attendance of a certain school grade following failure.

[9] The regulation mentioned here (ANEP, 1996) refers to old *curriculum* (*Plan 86*) and only applies to the school years 1996 and 1997. In 1996 a new curriculum was introduced (*Plan 96*) that changed both the content and the structure of teaching, the length of the school day (from 3.5 hours to 5 hours) and the rules determining promotion. As *Plan 96* was introduced experimentally in a few schools (*Liceos Pilotos*), the majority of students in 1996 and 1997 were still under the old Plan. The analysis in this paper excludes *Liceos Pilotos*.

[10] I refer to "score" as opposed to subject grade, as it would be more appropriate, in order to avoid confusion with the school grade attended.

failed in previous school years that the student has not in the meantime passed.[11] In the rest of the paper I use the discontinuity in grade progression between students with three failed subjects (who barely pass) and students with four failed subjects (who barely fail) to identify the effect of grade failure on later school outcomes.

II. DATA

The data used in this paper refer to students in Junior high (grades 7 to 9) in the years 1996 and 1997. The data follow these students' progression (in both Junior and Senior High) up to 2001 and report information on the institution and grade attended in each year, whether the student passed or failed that grade, number of missed school days plus basic demographics (age and gender) and - only for the school years 1996 and 1997 - scores for each subject at the end of the school year (in December, i.e. ignoring the results from the subsequent February re-take session).

The data include almost the universe of public non-vocational schools but exclude *UTU*'s and private institutions.[12] Because of this, I can measure whether a student is retained within the public (whether Junior or Senior) non-vocational system but I am unable to distinguish those leaving the educational system *tout court* from those moving to private or vocational intuitions. I return to this at the end of the paper. In addition, since there is no information on promotion or failure in 1999 and 2001, I measure school progression as maximum grade attended (as opposed to completed), i.e. independent of whether the student actually passed or failed the grade he was last observed attending.

[11] The second condition that must be simultaneously fulfilled is that the student has accumulated no more than 25 missed school days during the year. In an earlier version of this paper I used this rule to identify the effect of grade failure on grade progression. It turns out however that subject scores vary discontinuously at the 25 missed school days threshold, casting some doubts on the validity of the identification assumption. For this reason, in this version I only use the discontinuity at three failed subjects.

[12] A few schools are not in the sample although this problem tends to be less serious at the end of the period: the number of missing institutions is 56 in 1996, 59 in 1997, 13 in 1998 and 4 in 2000 (out of around 250 schools).

Table 1 provides some descriptive statistics. The data refer to individuals with valid subject score. The first panel refers to the entire sample, the second panel to those who fail, and the last panel to those who pass. Overall, there are 99,729 observations on 73,621 individuals.

Grade failure in row 1 shows that one in four children fail a grade each year. Row 2 examines number of additional school grades attended by the end of the period of observation, the main outcome variable. This is the difference between maximum grade attended by 2001 and the grade where the student was observed in Junior High in 1996 or 1997. This variable ranges from zero to five. Since, mechanically, grade failers have to be exposed to one extra year of schooling in order to potentially make up for the year lost due to repetition, I only follow passers until 2000. The average number of additional grades attended is on the order of 1.9. However, while passers accumulate around 2.4 extra school years, failers only accumulate approximately an extra half of a school year. This clearly suggests that grade failure is associated to worse school outcomes later in life.

Row 3 reports the survival rate, i.e. the probability of being in the sample in the last year of observation (respectively 2000 for passers and 2001 for failers). This is on the order of 15% for failers, and almost 50 percentage points higher for passers. Since right censoring is much more pronounced for passers, this implies that the estimated attainment gap between failers and non-failers in row 2 is likely overestimated.

Unsurprisingly, rows 4 to 6 show that, relative to passers, grade failers display higher absenteeism (35 versus 10 missed school days), a higher number of failed subjects (i.e. with score below 6, this number is 6.3 for failers versus 0.9 for passers) and a lower mean subject score (4.7 versus 7.2). The following rows show that grade failure is equally likely to occur in each of the school grades (row 7), and that failers are clearly older (row 9) than passers, implying that early repeaters are more likely to repeat again.

In sum, Table 1 shows that failers are more likely than passers to display characteristics that are associated to poor school performance.

III. SPECIFICATION AND IDENTIFICATION

To identify the impact of grade failure on school outcomes in the following I present regressions based on a (fuzzy) Regression Discontinuity Design that is derived from the promotion rule described above. The regression model allows controlling for the observed characteristics of students and their schools as well for the potential bias in the regression coefficients that stems from differential censoring in school outcomes across individuals originally observed in different grades (7, 8 or 9) or different years (1996 or 1997). In this section I also discuss the identification assumptions underlying the consistency of the proposed estimator.

Ignoring for simplicity other covariates, suppose that school outcomes Y depend additively on a continuous function $f(.)$ in the number of failed subjects, S, and on grade failure, F:

(1) $Y = \beta_0 + \beta_1 F + f(S) + u$

where u is an error term. The error term potentially includes a student's past attainment as well as other unobserved determinants of performance. As already pointed out, the OLS estimate of equation (1) is biased if u is correlated with F due to unobserved heterogeneity of reverse causality.

In order to circumvent this problem, in the following, I use the discontinuity in the failure rate at three failed subjects an instrument for grade failure in (1). Consistent with the rule, I assume that grade failure is a continuous function of the number of failed subjects $g(S)$ plus a dummy for three or more failed subjects $P=\mathrm{I}(S\geq 3)$:

(2) $F = \gamma_0 + \gamma_1 P + g(S) + v$

Under the assumption that, if not for the rule governing grade failure, school progression varies continuously around three failed subjects threshold, an Instrumental Variable estimate of equation (1), where (2) is the first stage equation, leads to a consistent estimate of β_1, the parameter of interest (Hahn et al., 2002).[13] Consistency of the IV estimator requires individuals not to sort around the discontinuity point based on unobserved determinants of the outcome variable (u), i.e. that assignment around the discontinuity is as good as random. I return to this point later on in the paper.

Figure 3 plots the probability of failing a grade on the number of failed subjects in the current year (equation (2)). The size of each point is proportional to the number of observations. Because I have no information on subjects failed in previous school years that the student has not in the meantime passed, I use only information on failed subjects in the current year, hence abstracting from the circumstance that students with three or fewer failed subjects in the current school year might eventually fail. Similarly, since I have no information on the result from the February retake session, just before the beginning of the following school year, I use information on failed subjects at the end of the school year (in December), hence ignoring that some students with four or more failed subjects in December might still eventually pass. Although this induces some fuzziness in the relationship between school progression and number of failed subjects, for the purposes of the identification it is sufficient that some discontinuity is present at three failed subjects (rank condition).

Figure 3 shows that the probability of failing a grade is less than 0.2% for those with no failed subjects, and it raises to around 9% at three failed subjects. This positive correlation between grade failure and number of failed subjects is expected because progression depends mechanically on the performance in each subject and because number of failed subjects proxies for a student's unobserved motivation or ability, or the opportunity cost of or returns to attending school. One can see that, at four

[13] There are plenty of applications of the RD design to schooling data. Typically, procedures and regulations attaining to students', teachers' or schools' behavior lead to discontinuities in treatment. See for example Angrist and Lavy (1999), van der Klaauw (2002), Jacob and Lefgren (2004, 2009), Urquiola (2006).

failed subjects, the probability of grade failure jumps to around 77% and it grows only modesty afterwards. This is consistent with the rule establishing grade failure with more than three failed subjects, although, for the reasons mentioned above, compliance if imperfect.[14]

Since grade failure appears to be a discontinuous function of the number of failed subjects, for failure rates to have an effect on school outcomes, one would expect outcomes to vary discontinuously at the three-failed subjects threshold too. Figure 4 analyzes the correlation between additional grades attended (up to 2001 for failers and up to 2000 for passers) and number of failed subjects for those in Junior High between 1996 and 1997, the reduced form equation. The number of additional grades attended falls monotonically with the number of failed subjects in Junior High. While those with no failed subjects accumulate on average 2.8 additional years of schooling, this number is about 0.25 for those with nine failed subjects, implying than one extra failed subject is associated to around 0.3 lower years of education. For the reasons mentioned above, this negative correlation is expected. More interesting, though, is the large jump in the outcome variable that is apparent between three and four failed subjects. This is a fall of around half a year from around 1.58 years at three failed subjects to 0.94 years at four failed subjects. Because this is the mirror image of the effect of failed subjects on grade failure in Figure 3, this suggests that grade failure has a negative effect on subsequent school outcomes.

In the following section I present estimates of model (1) and test for the sensitivity of the results to the inclusion of a number of observable controls (Lee, 2008, for an interesting application, see also McEwan and Urquiola, 2005).

[14] Note also that students with less than three failed subjects can fail due to the additional rule that prescribes a maximum number of 25 missed school days for promotion.

IV. ESTIMATES

IV.a RD Estimates: Failed subjects, Grade Failure and Final School Outcomes

In this section I present IV estimates of model (1). I measure the effect of the rule on failure rate in (2) as the estimated difference between the actual and the counterfactual failure rates at three failed subjects. I pool observations for 1996 and 1997, treating individuals who appear in the sample more than once as two separate observations. I follow Card and Lee's (2008) suggestion in the context of a Regression Discontinuity Design with a discrete running variable by modeling $f(S)$ as a parametric spline in S, whose shape and intercept I allow to vary on either side of the discontinuity point. In practice, I rescale the failed subjects variable by the value of the threshold (3) and I model $f(S)$ as a parametric polynomial in this rescaled variable interacted with the dummy for three or more failed subjects $P=I(S\geq3)$. The coefficient γ_1 in equation (2) hence measures the predicted discontinuous increase in grade failure at the three failed subjects threshold that I attribute to the promotion rule.

Row 1 of Table 2 presents the OLS estimates of equation (2), where the dependent variable is one for individuals failing a grade and zero otherwise, i.e. the first stage equation. Column 1 includes no controls if not a quadratic spline in failed subjects. Columns 2 and 3 include polynomials in the number of failed subjects of third and fourth order respectively. Column 4 presents a similar specification as in column 3, with a quartic spline in the number of failed subjects, with the addition of additive school, year and grade (7, 8, 9) fixed effects.

The estimated jump in the failure rate at the discontinuity point in column 2 is 56 p.p. The point estimate falls by around 20% (to respectively 43 or 42 p.p.) when a cubic or a quartic polynomial are included. One can visualize this jump in Figure 3, where I have superimposed to the data the estimated quartic splines on either side of the threshold using the estimates in column 3, row 1 of Table 2. The estimated gap at three failed subjects is the difference between the two curves fitted on either side of the threshold (0 to 3 and 4 to 9 failed subjects). The inclusion of school, grade and time fixed effects makes virtually no difference to the estimated coefficient: this is 44 p.p. (column 4 of Table 2).

In the middle part of Table 2, I report reduced form estimates of the model, where the dependent variable is now additional grades attended up to 2001 (censored to 2000 for non-failers). Results are somewhat sensitive to the inclusion of higher order polynomials: when a quartic in number of failed subjects is included, the point estimate is -0.38 and significant at conventional levels. Within group estimates, in column 4, where I control additionally for year, school, and grade fixed effects, are essentially the same. Predicted values from column 3 are also reported alongside the actual data in Figure 4: one can clearly see the predicted jump at three failed subjects on the order of a third of a school year.

Instrumental variable estimates in the bottom part of the table show some variation depending on the polynomial included. In column 1, with a quadratic spline, point estimates are on the order of -1, implying that grade failure leads to a loss of around one year in education. The specification with a quartic polynomial in column 3 leads to a point estimate of -0.91, i.e. a reduction in schooling of just less than one school year. When year, school and grade fixed effects are included, estimates are around 15% smaller and on the order of -0.8 school years.[15]

IV.b Potential threats to the consistency of the estimates

One major concern with the previous estimates is that assignment around the discontinuity point is not as good as random, invalidating the conditions required for consistency of the RD estimator (Lee, 2008, McCrary, 2008). For example, if pupils with better latent school outcomes are able to sort strategically

[15] IV estimates (not reported) are very similar if I define the treatment variable as strictly more than three failed subjects and I estimate the discontinuity at four rather than at three failed subjects.The OLS estimate with the same controls as those in column 5 is, for comparison, -1.746 (s.e. 0.017), around twice the RD estimate. As expected, OLS tend to exaggerate the negative effect of grade failure on subsequent school outcomes. This also implies that the correlation in Figure 1 only partly reflects a genuine negative effect of grade failure on later enrollment. In this sense, one should be extremely cautious in using the evidence in this Figure for policy recommendations.

precisely at three failed subjects or if teachers manipulate individual subject score so that students with higher chances of progressing are made to pass,[16] then the IV estimate will tend to exaggerate the effect of grade failure on subsequent school outcomes.

As a fist check for non-random assignment, Figure 5 reports the distribution of failed subjects. The Figure shows an almost monotonic fall in the density as the number of failed subjects. There is evidence, however, of some discontinuity in the density of the running variable at the threshold, as the proportion of those with four (or even five) failed subjects is below trend. That the p.d.f. of the running variable is discontinuous at the threshold is sometimes taken as an indication of a failure of the random assignment hypothesis, since this is suggestive of students' or teachers' ability to manipulate the running variable (McCrary, 2008). Although this might appear a somewhat worrisome feature of the data, failure of this test is not conclusive, as this is unable to shed light on whether such manipulation is correlated with latent outcomes. To the extent that sorting is uncorrelated with unobserved determinants of subsequent school outcomes, bunching at the threshold is not a threat to the consistency of the IV estimates in Table 2.

As an additional check for non-random assignment, hence, I examine the discontinuity in the observed covariates at the threshold (Lee, 2008). If sorting around the discontinuity point is a serious concern, one would expect observed covariates that are known to affect progression to vary discontinuously at the three failed subjects threshold.

Table 3 reports reduced form estimates of model (2) where the dependent variable is in turn a separate variable. I report specifications with a quartic polynomials in number of failed subjects, plus school, year and grade fixed effects as in column 4 of Table 2. Observed covariates are: missed school days, gender, age-grade distortion, scores (from 1 to 12) in each subject and mean score across all subjects. There is some slight evidence that those to the right of the threshold are worse performers:

[16] See Jacob and Levitt (2003) for evidence on teachers' cheating in response to incentives.

both accumulated delay and absenteeism are higher, but the coefficients are not statistically significant at conventional levels. For nine of the eleven subjects considered (i.e. with the exception of physical education and music/drawing), there is no evidence of a discontinuous change in test scores. The same is true for the mean test score, suggesting that score manipulation is not a major source of concern.

The is further confirmed in column 5 of Table 2 that reports the same specifications as in column 4 with the further addition of the controls in Table 3 (dummies for missed school days, a gender dummy, age-grade distortion dummies, and dummies for the score in each subject). The IV estimate falls by around 13% relative to the specification with no controls in column 4 but this difference is not significant at conventional levels.

IV.c Dynamics

Nothing so far allows us to understand why failers appear to lag behind non-failers. Is this due to drop-out or subsequent grade failure? And if drop-out contributes to explain this result, where does this precisely occur? Is drop-out just following grade failure or do instead grade failers tend to drop out of the system at a higher rate than non-failers even after a certain number of years? Or is instead the case that lower educational attainment four to five years down the line is due neither to these students failing again nor to them dropping out earlier but to the circumstance that grade failers are more likely to temporarily exit the system and then re-enter, so that the estimated gap in educational attainment masks a higher probability of intermittent attendance among failers?

In Table 4 I analyze the dynamics of grade failure. Here I report IV estimates for a number of additional outcome variables. Similarly to column 5 of Table 2, all the regressions in the table include the whole set of controls plus grade, year and school fixed effects. Columns 1 to 4 show the survival probability at time t (t=1, 4). One can see that grade failure is followed by a high drop-out rate. Grade failers are on average 50 p.p. less likely to be in school after one year compared to non-failers. Note that this includes the probability of being in any (non-vocational) school in the public system, not just the school where the student was observed at time t=0. Over time, as passers drop out or end their school cycle, the two distributions tend to converge and, after three years, failers effectively catch up with non-failers. By year four, the difference is on the order of -10 p.p. but statistically insignificant.

Column 5 reports the overall duration in the sample. This is a variable that ranges from zero to five. On average failers spend about 0.89 fewer years in the sample than non-failers, suggesting that early drop-out rather than the compounded effect of grade failure (among failers who repeat) largely explains why grade failers end up with lower educational attainment than non-failers.

As an additional outcome variable, in column 6 I analyze the effect of grade failure at time t=0 on intermittent attendance. I measure this as the probability of being in the sample at any time between two and five periods after failure conditional on <u>not</u> being in the sample 1 year after. I find no significant evidence of failers being more likely to attend intermittently than non-failers: the estimated effect is 0.028 but not statistically significant.

The following columns of the table report information on the number of additional grades attended by failers and non-failers, whether still in school or not, at any time t (=1,.., 4) following grade failure (t=0). Because, as said, attendance is measured in terms of the highest grade attended (rather than successfully completed), it does not make any difference to the result for the first period if failers drop out or not following grade failure. In either case, maximum grade attended will be the one they failed. Some non-failers can also drop out, though, so the difference in maximum grade attended the year after grade failure will be strictly less than one. As expected, grade failers have just below one year gap compared to the non-failers at time t=1 (-0.95). After two years, failers partially catch up with non-failers. The estimated gap is -0.81. This is possibly the result of lower drop-out rates or failure rates among those who originally failed at time t=0 and stayed on and those who passed. After four years, the difference in maximum grades attended is -0.91. This is close to, but slightly lower than, the effect on the censored distribution reported in Table 2 (-0.76), implying some additional gain among failers in the last year of observation.

In sum, the data show an early disadvantage for grade failers in terms of additional grades that is largely explained by early drop-out.

IV.d Endogenous mobility

Because of the nature of the data, that only refer to students in public non-vocational secondary schools, in the previous sections I might have erroneously classified students who move to vocational or private schools as drop-outs, and assigned them zero additional years of education while these students in fact pursue their studies elsewhere. This might potentially lead to downward biased estimates of the effect of grade failure, if failers are more likely than passers to leave *Liceos* for schools outside the system. In practice, though, there are two pieces of evidence suggesting that this is unlikely to be a major source of concern.

First, evidence from a follow-up phone survey of 660 individuals who dropped out of the first year of non-vocational Junior High School in 1997 reported in ANEP (2000) shows that of these only around 1.6% had moved to a private institution and 15% had moved to a vocational school in 1998. The largest majority of drop-outs from Junior High effectively fail to enroll in other schools.

As a second check, I have used micro data from the 1999 Uruguayan National Learning Census (*Evaluation censal de aprendizajes en terceros años del ciclo medio*) that collects information on all students (in both vocational and non-vocational schools and in both private and public institutions) in ninth grade. I have linked these data to the 1998 administrative records on students in public non-vocational Junior High in 1998 via a unique student identifier. This allows analyzing the destination state of students enrolled in public non-vocational schools in 1998. I restrict to those who either failed ninth grade in 1998 or passed eight grade in 1998, i.e. individuals potentially in ninth grade in 1999.

The data show that, among drop-outs, the largest majority (95%) exits the school system completely. More important, among those who drop out of the public non-vocational system, there is little appreciable difference in the probability of moving to a private or a vocational school between failers (6%) and non-failers (3%). This margin of endogenous selection is hence unlikely to affect my conclusions.

V. CONCLUSIONS

This paper uses administrative longitudinal micro data on students enrolled in public non-vocational Junior High school in Uruguay between 1996 and 1997 to assess the cost of grade failure as measured by its effect on students' subsequent school outcomes. Exploiting the discontinuity in promotion induced by a rule that establishes that a pupil failing more than three subjects will automatically fail that grade, I show that grade failure leads to drop out and lower educational attainment four to five years after failure on the order of 0.8 school years.

Similar estimates for the U.S.A. (Jacob and Lefgren, 2009) show negative effects of grade failure on high school graduation rates, although the estimated effect appears smaller than what found for Uruguay. These results suggest that grade failure might be a more serious problem in developing countries where compulsory schooling laws might be harder to enforce and students might have greater incentives to drop-out, due to poverty to the poor quality of the system.

Although this paper concentrates on the costs of grade failure, it must be emphasized that the benefits of this policy due to its deterrence effect on students' underperformance might be non-negligible. This is probably the ultimate reason why repetition policies are in place. Simple back of the envelope calculations show that, for such an incentive effect to offset the cost of repetition, one would expect 22% of individuals who do not incur the penalty to accumulate one extra year of schooling due to the threat effect of the rule.[17] In practice, it appears that one should have high incentive effects to compensate for what I estimate being the high costs of grade failure.

Precisely because of this tradeoff, in the U.S.A., the emphasis now seems to have shifted towards policies the combine grade retention - so to preserve the incentive effect - with remedial interventions - to attenuate the negative consequences of repetition and potentially make failure less likely in the future (for the experience of the Chicago Public School - a front-runner in implementing these policies, see Roderick et al., 1999). Recent experimental evidence shows substantial gains from informal inexpensive remedial education among more disadvantaged children in India (Banerjee et al., 2007), suggesting that even in developing countries this might be a viable alternative to repetition.

Because of this, many Latin American countries, including Uruguay, have, especially in the last decade, introduced compensatory education policies. These include a variety of measures: from conditional cash transfer programs (such as *Progresa*/*Oportunidades* in Mexico or *Bolsa Escola/Bolsa Familia* in Brazil, for all, see Fiszbein et al., 2009), to resource equalization across schools (such as FUNDEF in Brazil, see Menezes-Filho and Pazello, 2004; or CONAFE in Mexico, see Shapiro and Moreno-Trevino, 2004) and early childhood interventions. For Uruguay, in particular, there is evidence suggesting that the recent universalization of pre-schooling might lead to large gains in terms of lower grade repetition and school dropout (Berlinski et al., 2008).

[17] This is the effect of grade failure on additional grades, -0.76 - from Table 2, column 5, bottom row - times the proportion of failers, 26%, from Table 1.

References

Alexander, K.L., D.R. Entwisle and N. Kabbani, (2003), 'Grade Retention, Social Promotion, and 'Third Way' Alternatives', in Reynolds, J., Wang M.C., and Walberg H.J. (Eds.), Early Childhood Programs For A New Century, Washington, DC: Child Welfare League of America Press, 2003.

ANEP (1996), Circular 2306, 1996.

ANEP(1998), Circular 2320/98, 1998.

ANEP (1997), *Acta* 70 *Res.* 96, 1997.

ANEP (2000), Una visión integral del Proceso de Reforma Educativa en Uruguay 1995-1999, Montevideo, 2000.

Angrist, Joshua and Victor Lavy (1999), 'Using Maimonides' Rule To Estimate The Effect Of Class Size On Scholastic Achievement', The Quarterly Journal of Economics, 114, 2, 533-575.

Angrist, Joshua, Eric Bettinger, Erik Bloom, Elizabeth King and Michael Kremer (2002), 'Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment', American Economic Review, December 2002, 1535-1558.

Banerjee, Abhijit V., and Esther Duflo (2006), "Addressing Absence", Journal of Economic Perspectives, Vol. 20 (1), pp. 117-132

Banerjee, Abhijit V., Shawn Cole, Esther Duflo and Leigh Linden (2007), 'Remedying Education: Evidence from Two Randomized Experiments in India', Quarterly Journal of Economics, vol. 122(3), 1235-1264.

Barro, Robert J. and Jong-Wha Lee (2001), 'International Data on Educational Attainment: Updates and Implications', Oxford Economic Papers, 3, 541-563.

Behrman, Jere, Piyali Sengupta, and Petra Todd (2001), 'Progressing through PROGRESA: An Impact Assessment of a School Subsidy Experiment', Penn Institute Working Papers, No. 33, University of Pennsylvania, 2001.

Berlinski, Samuel, Sebastian Galiani, and Marco Manacorda, (2008),' Giving children a better start: Preschool attendance and school-age profiles", Journal of Public Economics, vol. 92, 1416-1440.

Bucheli, Marisa and Carlos Casacuberta (2000) 'Asistencia escolar y participación en el mercado de trabajo de los adolescentes en Uruguay', El Trimestre Económico, 267, 3, 2000.

Cascio, Elizabeth U. (2005), 'School Progression and the Grade Distribution of Students: Evidence from the Current Population Survey', IZA Discussion Papers, No. 1747.

Chaudhury, Nazmul, Michale Kremer, Jeffrey Hammer, Karthik Muralidharan, and F. Halsey Rogers (2005), 'Teacher Absence in India: A Snapshot', Journal of the European Economic Association, April/May 2005, Vol. 3, No. 2-3, 658-667.

Consejo de Educación Técnico Professional (2005), 'Ciclo Básico Tecnológico', August 2005, Montevideo, Uruguay.

Currie, Janet and Matthew Neidell (2007), 'Head Start Quality: What Matters and What Doesn't', mimeo, UCLA, Economics of Education Review, vol. 26(1), pages 83-99.

Da Silveira Pablo and Rosario Queirolo, (1998), ¿Son nuestras escuelas y *Liceos* capaces de enseñar?', CERES Working Papers, n.7, CERES, Montevideo, 1998.

Duflo, Esther (2001), 'Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment', American Economic Review, 91(4), 2001, pp. 795-813.

Eide, Eric R. and Mark H. Showalter (2001), 'The Effect of Grade Retention on Educational and Labor Market Outcomes', Economics of Education Review, 20, 6, 2001, 563-576.

Fiszbein, Ariel, Norbert Schady, and Francisco H.G. Ferreira (2009), Conditional Cash transfers, World Bank Publications.

Furtado, Magdalena, 'Trajectories Educativas de los Jóvenes: el problema de la deserción', Cuaderno de trabajo TEMS, no. 22, Montevideo, 2003.

Gomes-Neto, J., and E. Hanushek (1994), 'Causes and consequences of grade repetition: Evidence from Brazil', Economic Development and Cultural Change, 43, 1, 117-148.

Hahn, J., Todd, P. and Van der Klaauw, W. (2002), 'Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design', Econometrica, 69(1), 201-209.

Jacob, Brian A. (2005), 'Accountability, Incentives and Behavior: Evidence from School Reform in Chicago', Journal of Public Economics, 89(5-6), 2005

Jacob, Brian A. and Lars Lefgren (2004), 'Remedial Education and Student Achievement: a Regression-Discontinuity Analysis', The Review of Economics and Statistics, 2004, 86, 1, 226-244.

Jacob, Brian A. and Lars Lefgren (2004), 'The Effect of Grade Retention on High School Completion", American Economic Journal: Applied Economics. 1(3): 33-58.

Jacob, Brian A. and Steven D. Levitt (2003), 'Rotten Apples: An Investigation of the Prevalence and Predictors of Teacher Cheating', Quarterly Journal of Economics, 118, 3, 2003, 843-878.

Jimerson, S., B. Egeland, L.A. Sroufe and E. Carlson (2000), 'A prospective longitudinal study of high school dropouts: Examining multiple predictors across development', Journal of School Psychology, 38, 6, 2000, 525-549.

Jimerson, S., G. Anderson and A Whipple (2002),'Winning the battle and losing the war: Examining the relation between grade retention and dropping out of high school', Psychology in the Schools, 39 (4), 441-457.

Lee, David (2008), 'Randomized Experiments from Non-random Selection in U.S.A. House Elections', Journal of Econometrics, 142, 675-697.

Lee, David and David Card (2008), 'Regression Discontinuity Inference with Specification Error', Journal of Econometrics, 142, 655-674.

Menezes-Filho, Naércio and Elaine Pazello (2004), Evaluating the Effects of FUNDEF on Wages and Test Scores in Brazil, mimeo, University of San Paulo, Brazil.

Maurin, Eric and Dominique Goux (2005), 'The Impact of Overcrowded Housing on Children's Performance at School', Journal of Public Economics, 89, 797-819, 2005.

McCoy, A. R. and A.J. Reynolds (1999), 'Grade retention and school performance: An extended investigation', Journal of School Psychology, 37, 273-298.

McCrary, Justin (2008), 'Manipulation of the Running Variable in the Regression Discontinuity Design', Journal of Econometrics, Vol. 142, 698-714.

McEwan, Patrick and Miguel Urquiola (2005), Precise sorting around cutoffs in the regression-discontinuity design: Evidence from class size reduction, mimeo, Department of Economics, Columbia University, September 2005.

Oreopoulos, Philip, Marianne Page and Ann Huff Stevens (2006), 'Does Human Capital Transfer from Parent to Child? The Intergenerational Effects of Compulsory Schooling', Journal of Labor Economics, Vol. 24, No. 4, October 2006, pp. 729-760

Patrinos, H.A.and Psacharopoulos G. (1996), ' Socioeconomic and ethnic determinants of age-grade distortion in Bolivian and Guatemalan primary schools', International Journal of Educational Development, Volume 16, Number 1, January 1996, pp. 3-14(12).

Pischke, Jorn-Steffen, (2003), 'The Impact of Length of the School Year on Student Performance and Earnings: Evidence from the German Short School Years', NBER Working Paper, No. W9964, 2003.

Roderick, Melissa, Anthony s. Bryk, Brian a. Jacob, John O. Easton and Elaine Allensworth (1999), Interpretive Summary: Ending Social Promotion, Results from the First Two Years, Consortium on Chicago School Research, December 1999.

Schady, Norbert and Maria Caridad Araujo (2008), 'Cash Transfers, Conditions, and School Enrollment in Ecuador', Economia, 8, 2, 53-77.

Shapiro Joseph and Jorge O. Moreno-Trevino (2004), 'Compensatory Education for Disadvantaged Mexican Students: An Impact Evaluation Using Propensity Score Matching', World Bank Policy Research Working Papers, No. 3334.

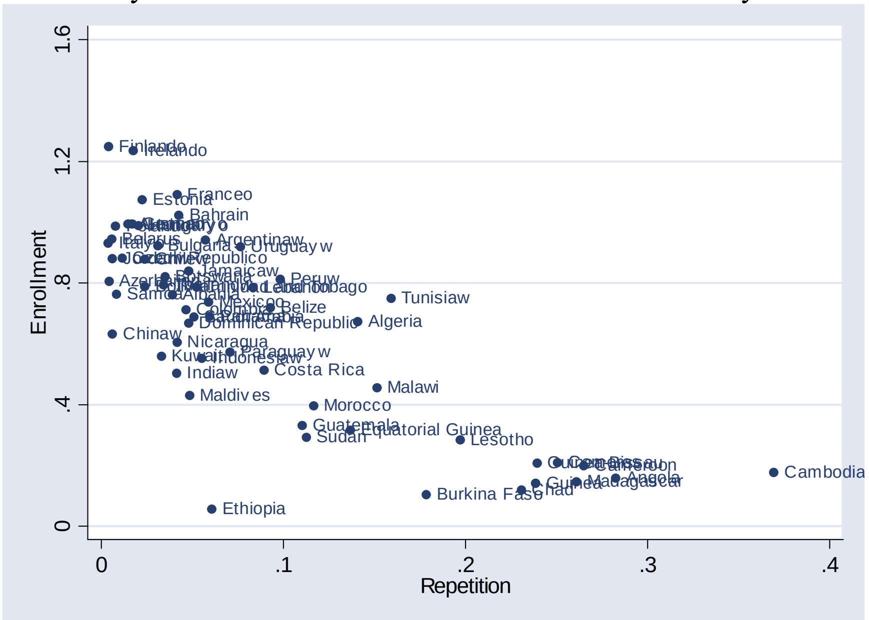
UNESCO (2002), EFA Global Monitoring Report. (Data available at: http://portal.unesco.org)

Urquiola, Miguel (2006), 'Identifying class size effects in developing countries: Evidence from rural Bolivia', Review of Economics and Statistics, 2006, 88(1).

Urquiola, Miguel and Valentina Calderon (2006), 'Apples and oranges: Educational enrolment and attainment across countries in Latin America and the Caribbean', International Journal of Educational Development, 26 (2006) 572-590.

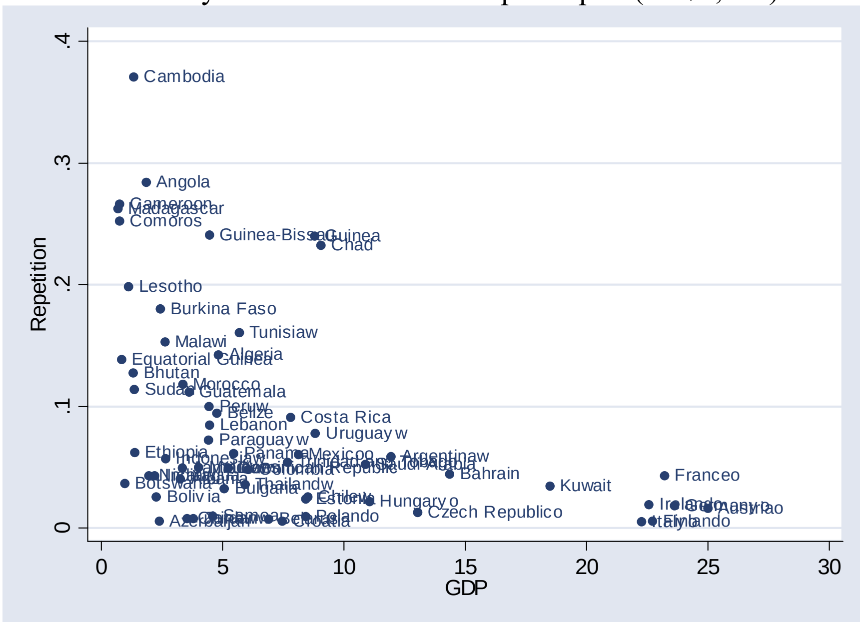
Figure 1

Repetition Rates in Primary School and Gross Enrollment Rate in Secondary School across Countries



Notes. The graph plots repetition rates in primary school on the horizontal axis and gross enrollment in secondary school on the vertical axis. The sample refers to countries with income per-capita not greater than US$28,000. Source: UNESCO (2002).

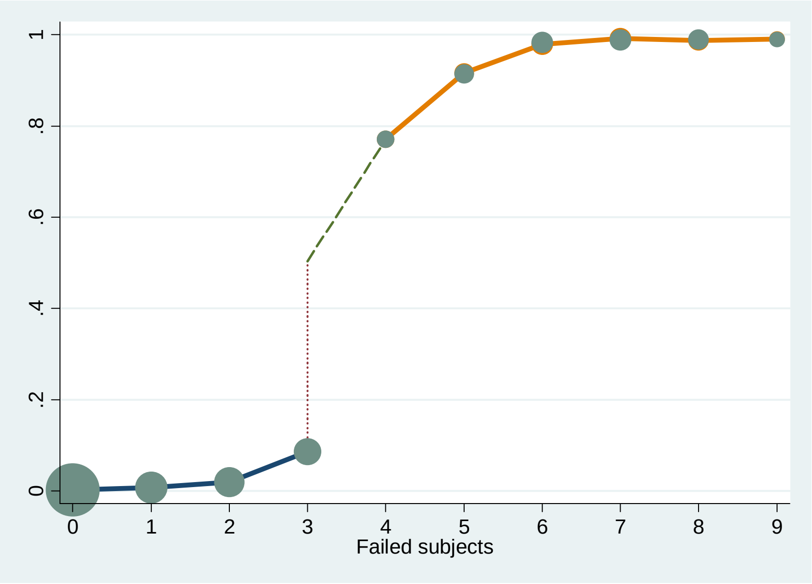
Figure 2
Repetition Rates in Primary School and PPP GDP per-capita (US$1,000) across Countries



Notes. The graph plots (1999) PPP GDP per-capita on the horizontal axis and repetition rates in primary school on the vertical axis. See also notes to Figure 1.

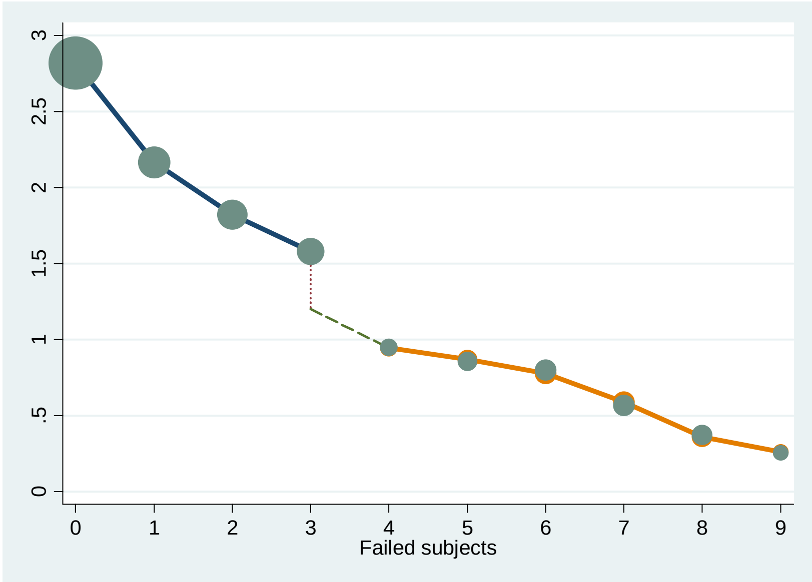
Figure 3

Grade Failure by Number of Failed Subjects in Junior High School, Uruguay: 1996-1997



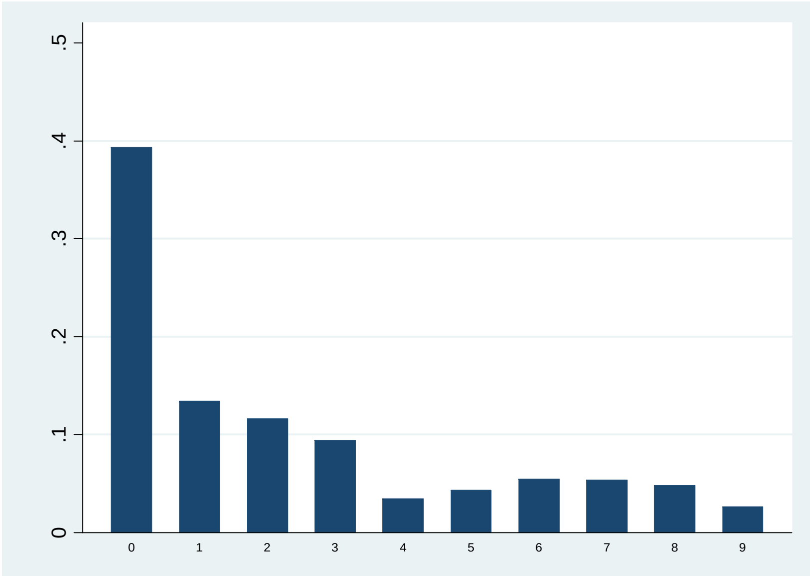
Notes. The figure reports the proportion of individuals failing a grade by number of failed subjects in the year. A quartic spline is superimposed to the data. Source: *Bases de datos de rendimiento a nivel de estudiantes en educación secundaria, Administración Nacional de Educación Pública, Uruguay*.

Figure 4
Additional Grades Attended by 2001 (2000 for non-failers)
By Number of Failed Subjects in Junior High School, Uruguay: 1996-1997



Notes. The figure reports the number of additional grades attended by 2001 among those in Junior High in 1996 or 1997 as a function of the number of failed subjects. The series is censored to the year 2000 for those who did not fail. A quartic spline is superimposed to the data. See also notes to Figure 3.

Figure 5
Proportion of Failed Subjects in Junior High School, Uruguay: 1996-1997



Notes. The figure reports the distribution of number of failed subjects. See also notes to Figure 3.

Table 1
Descriptive Statistics: Students in Junior High School, Uruguay: 1996-1997

		All	Failers	Passers
1.	Grade Failure	0.259	1	0
2.	Additional grades attended (by 2000/2001)	1.931	0.599	2.398
3.	Censored	0.517	0.150	0.646
4.	Failed subjects	2.335	6.351	0.928
5.	Mean subject score	6.573	4.701	7.229
6.	Missed school days	16.572	35.167	10.057
7.	School Grade	7.889	7.880	7.893
8.	Age	13.360	13.891	13.174
9.	Grade-age distortion	0.092	0.538	-0.065
10.	Female	0.544	0.457	0.575
	Observations	99,729	25,878	73,851

Notes. The table reports information on students in Junior High School in 1996 and 1997. The first column refers to the entire sample, the second column to those who failed a grade and the last column to those who passed. Row 1 reports the proportion failing that grade, row 2 the number of additional grades attended (until 2001 if a student failed a grade or until 2000 if a student did not fail), row 3 the proportion still in school at the end of the period (2000 for failers and 2001 for non-failers), row 4 the proportion of failed subjects, row 5 mean score across all subjects, row 6 the average number of missed school days, row 7 the average school grade (from 7 to 9), row 8 average age, row 9 average grade distortion (age-grade) and row 10 the proportion of girls. Source: *Bases de datos de rendimiento a nivel de estudiantes en educación secundaria, Administración Nacional de Educación Pública, Uruguay.*

Table 2
Failed subjects, Grade Failure and Subsequent School Attainment in Junior High School, Uruguay: 1996-1997

	(1)	(2)	(3)	(4)	(5)
			First stage Dependent variable: Grade failure t=0		
I(Failed subjects$_0$≥3)	0.562*** (0.034)	0.428*** (0.008)	0.417*** (0.024)	0.438*** (0.087)	0.426*** (0.085)
			Reduced form Dependent variable: Additional grades		
I(Failed subjects$_0$≥3)	-0.565*** (0.049)	-0.759*** (0.092)	-0.381** (0.134)	-0.380** (0.173)	-0.324** (0.153)
			Instrumental Variables Dependent variable: Additional grades		
Grade failure t=0	-1.005*** (0.136)	-1.773*** (0.236)	-0.912** (0.373)	-0.869** (0.358)	-0.760** (0.327)
Polynomial of degree	2	3	4	4	4
School Fixed effects	No	No	No	Yes	Yes
Grade fixed effects	No	No	No	Yes	Yes
Year effects	No	No	No	Yes	Yes
Additional controls	No	No	No	No	Yes

Notes. The top panel reports the OLS coefficients from a regression of a dummy equal one for grade failure on a dummy equal one for three or more failed subjects in Junior High (first stage equation). The middle panel reports the coefficient of the number of additional grades attended by the end of the period (censored to the year 2000 for non-failers) on the dummy for three or more failed subjects (reduced form equation). The bottom panel reports the IV estimates of the effect of grade failure on the number of additional grades attended, where grade failure is instrumented by a dummy for three or more failed subjects. Each column refers to a different specification. Specifications in columns 1 to 3 include, respectively, a parametric function in the number of failed subjects of degree 2, 3 and 4. Columns 4 and 5 also control for school, year and grade fixed effects. Additional controls include dummies for: number of missed school days, gender, age-grade distortion, and score in each subject. Standard errors in brackets are clustered by number of failed subjects (columns 1 to 3) and by the number of failed subjects by school, grade and year (columns 4 and 5). Number of observations: 99,729 ***, **, * denote, respectively, significant at 1%, 5% and 10% level. See also notes to Table 1.

Table 3
Failed subjects and Observed Covariates in Junior High School, Uruguay: 1996-1997
Reduced form estimates

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
								Subject scores						
Missed school days	Female	Age-grade distortion	Spanish	Math	Language	Geography	Biology	History	Physics	Drawing/ Music	Physical education	Chemistry	Social education	Mean
7.872	0.016	0.173	-0.091	0.133	0.181	-0.117	-0.240	0.010	0.029	-0.799**	0.753***	0.592	-0.135	0.003
(4.905)	(0.068)	(0.143)	(0.256)	(0.291)	(0.277)	(0.235)	(0.250)	(0.254)	(0.254)	(0.359)	(0.273)	(0.415)	(0.363)	(0.102)

Notes. Each entry in the table refers to a separate regression of each dependent variable on a dummy for three or more failed subjects. All specifications include a parametric function in the number of failed subjects of degree four, school, year and grade fixed effects. Number of observations 99,729 except in columns 13 and 14, where the dependent variable is only available for those in ninth grade and the number of observations is 28,259. See also notes to Table 2.

Table 4
Grade Failure and Subsequent School Outcomes in Junior High School, Uruguay: 1996-1997
IV estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Survival at time t=		Duration	Intermittent attendance			Additional grades at time t=	
	1	2	3	4			1	2	3	4
Grade failure t=0	-0.495***	-0.280*	0.064	-0.096	-0.886*	0.028	-0.955***	-0.809***	-0.796***	-0.903***
	(0.154)	(0.158)	(0.150)	(0.129)	(0.473)	(0.212)	(0.053)	(0.167)	(0.244)	(0.307)

Notes. Entries are IV estimates of the effect of grade failure at time t=0 on the dependent variable (in the top row) where grade failure is instrumented by the discontinuity at three failed subjects. Columns 1 to 4 refer to the probability of being in the sample in any given year (1, ..., 4) following grade failure. Column 5 to duration. Column 6 to intermittent attendance. Columns 7 to 10 to the number of additional grades attended by the individuals in the sample in any given year (1,...4) following t=0. All regressions include a quartic polynomial in number of failed subjects interacted with a dummy for three or more failed subjects plus dummies for: number of missed school days, gender, age-grade distortion, the score in each subject, school, grade and year fixed effects. Number of observations 99,729 except in column 6 where number of observations is 86,422. See also notes to Table 2.