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Abstract

In Uruguay, similar to many developing countries, the economic return to lower secondary studies is low. When heterogeneity is introduced in the analysis, it can be shown that differences in the quality of education and in the probability of repetition mark the contrast between an attractive and an inconvenient investment in secondary education between advantaged and disadvantaged students. The values of internal rate of return computed for the Uruguayan case allow concluding that, paradoxically, lower secondary education is an inconvenient investment for disadvantaged students, even disregarding the possibility of them not being able to afford the opportunity costs, explaining the heavy dropout rates of this student type. These results cast some serious doubts on the fairness of compulsory schooling laws that are not accompanied by complementary policies to ensure equal learning outcomes across socioeconomic groups.

Keywords: education returns, school quality, repetition rates

Resumen

Al igual que en muchos países en desarrollo, el retorno de la educación secundaria en Uruguay es bajo. Cuando en el análisis se considera la heterogeneidad de los estudiantes se puede ver que las diferencias en la calidad de la enseñanza y en la probabilidad de repetición hacen la diferencia entre una inversión atractiva o inconveniente según el estrato socio económico del estudiante. Los retornos de la educación computados para el caso uruguayo permiten concluir que, con cierta paradoja, la educación secundaria es una inversión inconveniente para los estudiantes de situación desventajosa, aun no teniendo en cuenta la posibilidad de que no puedan afrontar el costo de oportunidad de estudiar, lo que probablemente explique las altas tasas de deserción de ese grupo de estudiantes. Estos resultados plantean algunas dudas sobre la justicia o equidad buscada por las leyes de escolarización compulsiva que no sean acompañadas por políticas complementarias que aseguren igualdad de resultados educativos para los estudiantes de todos los grupos socioeconómicos.

Palabras claves: retornos de la educación, calidad de la educación, repetición

JEL: I21, J24

1 Introduction

Standard approaches to education returns estimations are reviewed in Glewwe (1996), Psacharopoulos (1995), Psacharopoulos and Patrinos (2004), among others, which heavily rely on the labor market return on the number of schooling years completed. However, it has widely been accepted that human capital cannot be measured adequately by the years of schooling, as for instance, the quality of education received directly affects the individual's endowment of human capital; also, the occurrence of repetition leads to errors in opportunity costs estimates when the years of schooling completed rather than the calendar years needed to complete them are considered. Several improvements to the standard approach have been suggested. Although some improvements considered the quality of education, the implication and effects of considering the inclusion of the occurrence of grade repetition is rarer in the education returns literature. The implications of education quality on dropout decision and on education return are discussed for instance in Hanushek et al. (2006), but the topic is not a frequent one. The prevalence of repetition has, in general, received scarce attention, and the more controversial aspect is the sense of failure and, consequently, the lowered expectations (Jacob and Lefbren, 2004, 2007; Sautu, 1999; Rose et al., 1983, among others); thus, economic effects of repetition have not been in the center of the discussion.

As Eckstein and Wolpin (1999) demonstrate, expectations of economic return affect the number of high school graduates; this paper shows, by means of some basic computations, that due to higher repetition rates and lower school quality received by disadvantaged students, the expected economic return of this group of students may be negative, which may thus explain the heavy participation of this group in early school dropouts. This article pursues a similar aim as that of Behrman and Deolalikar (1991), though, using a different approach that widens the scope of students' heterogeneity. The relevance of heterogeneity is that it allows to focus on an equity issue; the paper follows a similar approach to that in a companion paper (Patron, 2008), although, contrary to that paper, the emphasis here is on the comparison of returns across heterogeneous students.

The organization of the rest of the paper is as follows. Section 2 presents the current situation of school attendance to the education system in Uruguay. Section 3 describes the

methodology and presents the computation of the internal rate of return of secondary school across student groups. Section 4 concludes.

2 Education in Uruguay: is inequality an issue?

The distribution of educational attainment across income groups can be described by using several data sources. For instance, Table 1 presents the educational attainment of the population by income quintiles, showing that although the completion of primary school is similar across income quintiles (near top levels), the completion rates at higher levels are not. There is an important gap at the lower secondary level, where the percentage of the population that completes this level in the lowest quintile is less than half of that in the highest quintile. The gap is even wider at the upper secondary, where the percentage of the population which completes the level in the highest quintile is almost ten times higher than in the lowest quintile.

Table 1 Educational attainment by income quintiles (percentages). Uruguay 2008

	Primary	Lower secondary	Upper secondary
Quintile 1	86.2	41.4	7.8
Quintile 2	92.7	60.0	20.2
Quintile 3	96.6	72.6	32.7
Quintile 4	97.5	85.7	46.9
Quintile 5	98.5	94.9	70.0

Source: MEC (2009).

A different perspective of the same phenomenon is shown in Table 2, where the school trajectories by age are described for each income group. There is a clear homogeneity in the rates of school attendance for the ages corresponding to primary education (6-11 years old) where attendance is universal, although the situation is not the same for ages pre- and post-primary. The table also shows that, in both cases, the rates of attendance are lower the lower the income group; for the post-primary ages, the rate of attendance is reduced at a higher speed the lower the income group.

Table 2 School attendance by income quintiles, ages 3-19 (percentages). Uruguay 2009

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Quintile 1	40	82	96	99	99	98	99	100	99	98	91	84	72	63	52	33	22
Quintile 2	54	84	98	99	99	99	99	98	98	98	95	92	83	75	64	42	36
Quintile 3	67	89	98	99	99	99	98	99	99	98	97	96	88	84	76	57	43
Quintile 4	81	96	98	99	98	100	100	98	100	99	97	97	97	92	83	72	57
Quintile 5	83	98	99	99	100	98	99	100	100	98	99	99	98	98	96	81	81

Source: MEC (2010)

However, differences in attendance rates are not the only problem affecting lower secondary that raise equity concerns. This is so as observed students' performance, measured by repetition rates or by standardized tests, are also segmented by income groups. Table 3 shows repetition rates for lower secondary by socioeconomic context, where besides being high, there is a significant dispersion, with higher rates for the disadvantaged group.

Table 3 Repetition rates in lower secondary by socioeconomic groups. Uruguay 2002

Grades	Disadvantaged	Advantaged
1	30	20
2	25	20
3	27	21

Source: ANEP (2005)

Another perspective of the same phenomenon of unequal student achievement across socioeconomic groups can be obtained from the results of the standardized tests PISA. The results of this test show a significant association between educational achievement and socioeconomic background for 15-year-old students corresponding to complete lower secondary. The test results are classified into six levels, with level 2 as the competence threshold. Table 4 reflects the unequal composition of the PISA 2009 results (reading scores) in the case of Uruguay: the share of results below the competence threshold is around 70% for the less advantaged group, whereas it fell below 8% for the more advantaged group.

Table 4 PISA test: reading scores composition by socioeconomic context. Uruguay 2009

	Very favourable	Favourable	Medium	Disadvantaged	Very disadvantaged
level 4-6	39.1	15	7.7	1.2	1.4
level 3	33.4	34.2	22.4	7.2	7.1
level 2	19.7	32.3	33.5	22.9	23.1
below threshold	7.7	18.5	36.3	68.7	68.4

Source: ANEP (2010

In summary, the above description shows that educational attainment across income groups is significantly unequally distributed. The rationale behind the schooling decisions that may have led to this situation is discussed in the rest of the paper.

3 Returns to education

For the individual, the economic benefit of further education is given by the difference in lifetime income with and without additional schooling. The economic benefit can be calculated as:

$$B_{j+1k} = EI_{j+1k} - IW_{jk} \tag{1}$$

where sub-indexes j and k represent schooling level and student group, respectively; EI_{j+1k} is the present value of the expected lifetime income of those who decide to study an additional level, and IW_{jk} is the present value of income for those who decide to work immediately with the qualification acquired up to level j.

The earnings received in the labor market depend on the qualifications received during the schooling years. The cumulative nature of the learning process can be described as follows. The educational output per student, $q_{jk} = q_{jk}\left(k_{jk}\right)$, where k_{jk} is the resource intensity per student, is the amount of knowledge embodied upon successful completion of studies. Students' acquired knowledge defines 'school quality' following Hanushek (1979), therefore the *output per student (q_{jk}) measures school quality*. Progress inside the system depends on school quality, then repetition rates are $\gamma_{jk} = \gamma_{jk}\left(q_{jk}\right)$, where $\partial\gamma_{jk}/\partial q_{jk} < 0$. Successful students accumulate knowledge, whereas repeaters do not. The accumulation of

q_{jk} during the schooling years is described by $f_{mk} = \sum_{j=1}^{m} q_{jk}$, which measures the total knowledge accumulated per student in group k who has completed up to level m; this indicator will measure individuals' productivity in the labor market. Thus, an individual's income in the labor market will be $f_{mk}\, w$, where w is the return of an efficiency unit of labor.

Thus, the present value of income for those who decide to work immediately with the qualification acquired up to the level achieved is given by

$$IW_{jk} = \sum_{t=1}^{T} f_{jk}\, w\beta^{t}$$

where T is the time horizon, w is the wage rate per efficiency unit (assumed constant), $\beta^{t} = 1/(1+d)^{t}$ is the discount factor, and d is the discount rate.

For the computation of the present value of expected lifetime income of further studies, EI_{j+1k}, it is necessary to consider the alternative schooling path due to the occurrence of repetition . A general expression for EI_{j+1k} is given by

$$EI_{j+1k} = (1 - a_{j+1k})\, IS_{j+1k} + a_{j+1k}\, IR_{j+1k}$$

where a_{j+1k} is the probability of repetition at level $j+1$ for students of type k and IS_{j+1k} and IR_{j+1k} are the lifetime income for successful students and repeaters. For computation purposes, all alternative paths through schooling years need to be considered (see below).

Some basic computations

The discount rate that makes the benefits $B_{j+1k} = EI_{j+1k} - IW_{jk} = 0$ is the internal rate of return (IRR) of the individual schooling investment. Some basic calculation can provide a partial evaluation of the IRR of lower secondary studies for the different groups of students in Uruguay. Using Expression (1), the IRR can be obtained by performing the following sketchy procedure.

a) Mapping paths for students in lower secondary

Considering the frequent occurrence of repetition in developing countries, the path through lower secondary is not straightforward. The options, assuming that individuals will not try again after two consecutive repetitions, are listed in Table 5. The first column lists all possible paths, repeat (r) or pass (p) each grade in lower secondary (1, 2, and 3), the second column lists the qualifications acquired during the corresponding path, and the third column reflects the actual working life span for each option considering the calendar years effectively needed to acquire the qualification (with 65 years old as retirement age, the working life span for those not enrolling in lower secondary is 65-12=54).

Table 5 Mapping paths in lower secondary

Path	Qualification	Working life
r_1r_1	f_0	(54-2)
$r_1p_1r_2r_2$	fls_1	(54-4)
$r_1p_1r_2p_2r_3r_3$	fls_2	(54-6)
$r_1p_1r_2p_2r_3p_3$	fls_3	(54-6)
$r_1p_1r_2p_2p_3$	fls_3	(54-5)
$r_1p_1p_2r_3$r3	fls_2	(54-5)
$r_1p_1p_2r_3p_3$	fls_3	(54-5)
$r_1p_1p_2p_3$	fls_3	(54-4)
$p_1r_2r_2$	fls_1	(54-3)
$p_1r_2p_2r_3r_3$	fls_2	(54-5)
$p_1r_2p_2r_3p_3$	fls_3	(54-5)
$p_1r_2p_2p_3$	fls_3	(54-4)
$p_1p_2r_3r_3$	fls_2	(54-4)
$p_1p_2r_3p_3$	fls_3	(54-4)
$p_1p_2p_3$	fls_3	(54-3)

Source: Own elaboration. Note: p, pass; r, repeat; grades i=1,2,3, fls_i qualification acquired up to grade i of lower secondary; f_0, qualification prior to entry level.

The values of fls_i, $i = 1,2,3$, indicate the accumulation of knowledge in each grade i (given by qls_i). For computation purposes, it is assumed that the acquisition of knowledge is equal for every grade (qls_i equal to a third of q_j for the level).

b) Estimation of non-observable variables

The procedure to estimate non-observable variables is taken from Patron (2008). For the average student/worker, non-observable variables q_j and f_j for the average qualified student can be proxied by information on workers remuneration by schooling (r_j) as:

$$r_{j+1} - r_j = f_{j+1}w - f_j w = q_{j+1}$$

Using this expression and data from average monthly wages by qualifications from the National Census Bureau of Uruguay, the indicators q_j and f_j are computed as shown in Table 6, normalizing remuneration for workers without qualification to one and setting $w = 1$.

Table 6 Computation of non-observed variables using remuneration data

Level	*Remuneration*	f_j	q_j
Without primary or incomplete	3901	1.00	
Primary	5075	1.30	0.30
Lower secondary	5723	1.47	0.17
Upper secondary	8047	2.06	0.60
University	15372	3.94	1.88

Source: Own elaboration using data from INE (2005), remuneration corresponds to average monthly wages in Uruguayan pesos

c) Heterogeneity in quality

For q_j, the assumed dispersion around the average for advantaged and disadvantaged students is: high (50%) and low (10%). This range will very likely include the actual dispersion levels, if the dispersion of PISA results (around 15-20%) are a valid reference for this purpose.

d) Internal rate of return

Table 7 presents the IRR for lower secondary school in a time horizon covering the whole working life span, considering repetition and without it. The cases of high and low

dispersion of qualifications across income groups for the same schooling level are also considered.

Table 7 Internal rate of return for heterogeneous students

	Average	High dispersion		Low dispersion	
		Advantaged	Disadvantaged	Advantaged	Disadvantaged
IRR without repetition	3.4	5.0	0.8	3.7	2.9
IRR with repetition	0.5	2.6	negative	1.4	negative

Source: Own estimates.

As can be seen in Table 7, the IRR is low for the average student, computed with and without repetition. For the advantaged student, the IRR is at reasonable levels (2.6%-5%) for the high dispersion case, whereas the values obtained are lower when dispersion is lower (1.4%-3.7%). However, for disadvantaged students, pursuing lower secondary studies could have a negative return when we take into account the occurrence of repetition, in any case, low and high dispersion; even when repetition is not considered, the IRR is very low. Thus, the IRR values computed for the Uruguayan case allow concluding that lower secondary education is an inconvenient investment for disadvantaged students as they would obtain a negative return.

4 Conclusions

In Uruguay, the educational attainment of the population is significantly unequally distributed across income groups, particularly for post-primary education. For instance, in the lowest quintile only around 40% complete lower secondary, whereas in the highest quintile this share is near 95%. The paper discusses the rationale behind the schooling decisions that may have led to this situation.

As in many developing countries, the economic return to lower secondary studies in Uruguay is low. Moreover, when heterogeneity is introduced in the analysis it can be shown that differences in the quality of education and in the probability of repetition makes the difference between an attractive and an inconvenient investment in secondary

education between advantaged and disadvantaged students. The values of the IRR computed for the Uruguayan case allow us to conclude that, paradoxically, lower secondary education is an inconvenient investment for disadvantaged students—even disregarding the possibility of them not being able to afford the opportunity costs—explaining the heavy dropout rates of this student type. These results cast some serious doubts on the fairness of compulsory schooling laws that are not accompanied by complementary policies to ensure equal learning outcomes across socioeconomic groups.

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