

# **Schooling progression in Uruguay: Why some children are left behind?**

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## **Abstract**

This paper examines whether parental education, race, cognitive and non-cognitive abilities, influence individual's schooling progression in Uruguay. By accounting for the dynamics of the child's educational path through a sequential probability model I analyze the influence of parental traits at different schooling stages. Thus, this analysis gives a more complete picture of how inequality of education attainment came about. The results show different effects of parental background, cognitive and noncognitive abilities in different stages of the educational path. In line with previous studies, I find that early child's life cycle is a sensitive period in the formation of cognitive skills with persistent effects across the education schooling transitions. Noncognitive ability is seen to be more malleable at later stages. This, in turn, call for different interventions in different periods of the individual's life cycle.

## **1. Introduction**

It is well known in the literature that children's parental background plays a major role in explaining educational inequality. Several studies have shown that children of well-off parents generally receive more and better schooling and benefit from material, cultural and genetic inheritances (Checchi, 2006). Inequality of opportunity in the acquisition of education thus, may well translate into inequality of economic opportunities, such as unfair earning inequalities. As long as large differences exist in educational opportunities, individuals will have different chances of success in life.

In turn, the highest achieved level of education is the most visible result of education in subsequent areas of life like the labor market. Attaining a level of education is something that typically happens over a long period of time and is usually split into different schooling stages, for example finishing primary education, finishing secondary level, etc. Therefore, knowing the influence of parental background variables at each stage of the schooling transition can give a more complete picture of how inequality of education attainment came about. In turn, each of the alternative transmission channels pointed by the literature call for specific policy prescriptions at different stages of the schooling progression, which may well have different effects on equity and efficiency of the education system and subsequent labor market outcomes.

The objective of this paper is to analyze to what extent intergenerational transmission of parental traits takes place for children's educational attainment in Uruguay. Specifically, this paper aims to study whether parental education, race, and child's multiple abilities are key determinants of educational path decisions and, if they are, at what stage in the schooling process they take on their importance.

Uruguay is a particularly interesting country for many reasons. Uruguay is a country that stands out in the Latin-American region because of a large tradition of publicly provided education and social inclusion. For instance, primary school was made compulsory in 1877, universal primary schooling was achieved in the 1950s. Also, poverty rate and income inequality indicators are among the lowest in the region (Panorama Social de America Latina, Cepal, 2012).

However, the Uruguayan education system shows major shortcomings. From 1960 to 2000 for example, while average years of education in the population over 25 in the USA has risen by around 4.5 years (from 8.7 to 12.2), in Uruguay this growth has been in order to 2.1 years (from 5.1 to 7.2) (Barro and Lee, 2001). In the Latin-

American context, while the proportion of population aged 18 to 29 living in urban areas with complete secondary in 2000 is less than 20% in Uruguay; this rate is 40% in Chile and 30% in Paraguay (SITEAL, 2005). Chile presents higher indicators of income inequality than Uruguay and Paraguay ranks below Uruguay in terms of the Human Development Index. Several studies stress that the Uruguayan educational system is unable to retain a large share of students in junior high-school (Furtado, 2003; da Silveira and Queirolo, 1998), picture that worsens when educational attainment across afro and non-afro descendants is analyzed.<sup>1</sup>

The contributions of this paper are threefold. First, contributes to the empirical literature by focusing on whether parental background, race, multiple abilities and other factors are key determinants of young people' (or their parents) educational choices. By analyzing the effect of parental background at different decision points in the schooling transition process, it is possible to disentangle a direct effect of parental background on the educational level attained, but also, an indirect effect to the extent that parental background affect previous educational choices.

Second, the rich dataset used in this study enables me to study the impact of cognitive and non-cognitive abilities on an individual's educational path. Then, this study goes beyond by saying that measures of cognition are important predictors of child's outcomes, and by identifying the different effects of diverse abilities across an individual's schooling transition, thus contributing to the recent literature of multiple abilities developed by Bowles and Gintis (2001, 2002) and Heckman and co-authors in the analysis of schooling progression in a middle-income country such as Uruguay.

Third, empirical studies analyzing the impact of family background variables on education attainment are scarce in Uruguay, in part due to the lack of previous existing data. Previous studies analyzing intergenerational mobility in Uruguay are generally based on National Household Surveys, which contains information of the family background only for those individuals living in the origin household. Then, individuals not living in the household of origin are excluded from the analysis, possibly biasing the results. In addition, the National Household Surveys does not provide information on educational past history, such as repetition in primary and secondary level.<sup>2</sup> The dataset used in this study allows me not only to fulfill the above mentioned issues, but also to

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<sup>1</sup> See Table A.2 in the Appendix.

<sup>2</sup> One exception is the Amplified National Household Survey (ENHA: Encuesta Nacional de Hogares Ampliada) carried only on 2006, an amplified survey with a specific module on education.

take into account an individual's educational history and exploit information on noncognitive abilities.

For the purpose of this paper, I use a unique micro-dataset elaborated by the Uruguayan Statistics Institute: the Youth National Survey (ENAJ: *Encuesta Nacional de Adolescencia y Juventud*), a cross-sectional national representative survey on adolescence and youth conducted in 2008. The sample is based on the same households interviewed in the Continuous Household Survey (ECH: *Encuesta Continua de Hogares*) for 2008, and then being possible to merge the information from both surveys. Through the combination of these databases, detailed information on socio-demographic characteristics, migration experience, labor market experience, education achievement and past educational history, risky behaviors (tried marijuana or harder drugs before age 15), parental education, among others, is provided. Despite the survey is not longitudinal, it contains retrospective information allowing me to construct educational trajectories, as well as early behaviors of interest for theoretical ages of participation in the education system.

The empirical strategy considers a dynamic educational model developed by Cameron and Heckman (1998, 2001) in which schooling attainment is modeled as the outcomes of sequential choices made at each educational level using probability models and conditional on previous educational choices. The model accounts for individual's unobserved heterogeneity, such as ability or motivation, which may affect individuals' schooling progression. More able and motivated individuals may progress to higher grades. Thus, it is necessary to account for this selection in order to estimate the causal effect of key socioeconomic variables on educational attainment.<sup>3</sup>

Our results suggest that parental background greatly influence child's schooling transitions. Students with more favorable parental educational backgrounds and with better performance in the educational system are more likely to survive higher schooling stages. Race is an important factor preventing school progression for girls, and in a lesser extent for boys' educational attainment. In turn, noncognitive ability, while important, plays a minor role in comparison to scholastic ability in the schooling progression. Finally, financial family resources are also an important factor deterring postsecondary enrollment. Overall, our results suggest that early child's life cycle is a

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<sup>3</sup> Across this study cognitive ability, scholastic ability and performance in different educational levels are used as synonyms, while socioemotional endowments and noncognitive abilities are used interchangeable.

sensitive period for the formation of cognitive skills which has persistent effects on higher stages of the schooling transition. Noncognitive abilities seem to be more malleable at later stages of the child's educational path. Thus, public intervention call for different strategies focused on cognitive and noncognitive abilities at different stages of the life cycle in order to compensate more disadvantaged parental backgrounds.

The remainder of this paper is organized as follows. The next section presents an overview of the literature on education and inequality of opportunity. Section 3 describes the Uruguayan educational system. Section 4 describes the methodology framework. Section 5 introduces the data and presents descriptive analysis. Section 6 presents and discusses the main findings of the study. Finally, Section 7 concludes.

## **2. Literature review. Education and Inequality of Opportunity**

This paper is broadly related to the literature which analyze the different factors that influence on individual's education attainment. It is well known in the literature that higher education is positively correlated with higher income. Thus, a pertinent question is why individuals choose different levels of education. Checchi (2006) stress that families are often unaware of the economic benefit of education or are prevented from sending their children to further education by their financial needs. The literature on education and inequality of opportunity has focused on the factors preventing full access to education. The most accepted concept of inequality of opportunity refers to the notion that inequalities which are originated by an individual' circumstances, like gender, ethnicity/race, place of birth, family background, which are beyond the individual's control, are considered ethically unacceptable while inequality resulting from individual's effort and choice are ethically accepted (Roemer, 1998). This definition requires that any inequality attributed to the influence of exogenous circumstances should be reduced, compensated by public interventions.

Different studies have emphasized that educational choices are conditioned by individual unobservable abilities, family cultural background, family financial resources, public resources, residential choices and social capital.<sup>4</sup> Most of these factors exhibit intertemporal and intergenerational persistence. For instance, Heckman and coauthors (Cameron and Heckman, 2001; Heckman and Carneiro, 2003; Cunha and

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<sup>4</sup> See Checchi (2006) for an exhaustive overview of the literature on Economics of Education.

Heckman, 2007) refer to the long-term parental income reflected by parental education, scholastic ability, motivation, time preferences, risk aversion and self-esteem, as important factors determining later success in life.

According to Checchi (2006), four alternative channels have been proposed in the literature. Each alternative channel in turn, calls for specific policy recommendations. The first mechanism relates to the genetic transmission of ability from parents to their children. This leads to more able parents giving birth to more able children, who in turn, naturally receive more education.

A second channel relies on cultural influences, and works through the educational system. Children of educated parents are more likely to acquire education. This may be partly due to parent imitation (if they see their parents reading a book, they get the idea that reading is a rewarding activity), or through induced educational choices. For instance, an educated parent is better aware of the psychological and economic value of education, and therefore puts more pressure on her children to achieve more at school. Also, an educated parent always has some advantage in collecting information about school quality if the educational system is not homogeneous, and can reorient her child's choices towards better opportunities. In addition, it is well established in the literature that better educated persons prefer to pair off with other educated persons, making the cultural background within a family more homogeneous, and the influences received by each parent reinforce one another.

A third channel derives from liquidity constraints. If access to education is limited by family financial resources, and higher education give access to higher-paid jobs, this leads to a poverty trap in which poor families are prevented from investing in the education of their children by a lack of resources and inability to access financial markets. Thus, their children remain uneducated and poor, and in turn, are unable to invest in their grandchildren either. Finally, the last source of intergenerational persistence emerges from residential segregation, and is related to family wealth. If residential choices are influenced by the evaluation of local school quality, and school quality affect house prices, then richer families will gain access to better schools by locating closer to them. Better school quality combined with a more homogeneous cultural neighborhood will yield greater social capital, thus providing a clear advantage to children raised in that environment.

A common empirical strategy used in the literature to study the alternative mechanisms through which intergenerational transmission operates, consist on

regressing one individual's educational attainment on her parental education, income, or occupation; institutional variables (as type and/or composition of institution attended), controlling for factors beyond a child's control such as her gender, race/ethnicity, place of birth, household composition, among others (for example Bourgignon, Ferreira and Menéndez, 2003; Ferreira and Gignoux, 2008; Peragine and Serlenga, 2007, among others).<sup>5</sup> The coefficient relating parental background and a child's outcome measures the intergenerational transmission of certain attribute from one generation to the next one. González and Sanromán (2010) estimate the intergenerational educational mobility for afro and non afro-descendants in Uruguay. Based on National Household Surveys, the authors estimate different mobility indexes and apply analysis of variance decomposition techniques.

Other studies analyze the impact of parental background on the individual probability of attaining a certain level of education, such as the probability of postsecondary graduation, or the probability of being enrolled in a particular level of education. Porzecanski (2008) studies the determinants of the educational gap between afro and non afro-descendants in Uruguay. Through standard logit models, the author analyze the factors influencing repetition in primary level for the population aged 7 to 17, and the probability of dropping-out the educational system for adolescents between 13 to 17.

In this study, I follow an alternative approach developed by Cameron and Heckman (1998, 2001). These authors analyze the educational level attained by one individual as a sequential process, in which the individual choose the educational level conditional on having completed the previous educational level. By doing so, it is possible to study how different variables of interest affect the educational attainment, and at which stages of the educational path.

This framework depart from an empirical regularity established in the sociology of education, that the estimated effects of family background and family resources on the probability of transiting from one grade to the next diminish at higher levels of education (Mare, 1980). Cameron and Heckman (1998, 2001) develop a model in which an individual' schooling progression depends on her observable characteristics, like gender, race/ethnicity, and family background, but also is influenced by her unobservable characteristics, such as motivation or ability.

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<sup>5</sup> See Ramos and Van der gaer (2012) for an exhaustive review of the literature on Inequality of Opportunity.

At the same time, individuals moving from one educational level to the next one differ on their unobservable characteristics, in which the less able or motivated individuals are less likely to succeed in the transitions to higher education stages. The authors stress that in each stage the opportunity cost of school attendance is different. Hence, if we consider that school levels become more and more selective the higher you go, it is possible to imagine sort of increasing the non-monetary costs of schooling.

Thus, in a dynamic framework, two factors induce biased estimations of the effects of family background on schooling progression, the first one refers to omitted variables (that is not accounting for individuals' ability or motivation), while the second one refers to the selection taking place at different stages of the schooling transitions. These two factors, in turn questions the diminishing effects of family influences on the probability of moving from one grade to the next at higher levels of education previously found in the sociology of education literature. A more detailed description of the model is provided in Section 4.

In general, empirical studies measure abilities with previous performance in the educational system, such as repetition or test scores. These measures have been criticized by recent literature. Indeed, the literature has recognized that abilities are multiple in nature and that previous studies using IQ or previous performance (repetition, test scores) measures does not properly account for ability. Non-cognitive abilities, such as perseverance, motivation, risk aversion, self-esteem, self-control, have direct effects on wages (after controlling for schooling), schooling, performance on achievement tests, and other aspects of social and economic life.

For instance, Bowles and Gintis (2002) stress that *“inheritance process operating through superior cognitive performance and educational attainments of those well-off parents, while important, explain at most half of the intergenerational transmission of economic status. Moreover, while genetic transmission of earnings-enhancing traits appears to play a role, the genetic transmission of IQ appears to be relatively unimportant”*. These authors conclude that empirical studies on intergenerational transmission of economic status have over-studied education and cognitive abilities, while other individual characteristics such as wealth, race and non-cognitive behavioral traits have been under-studied.

Unlike other personal traits like height or weight, personality traits cannot be directly measured. Observed productivities, efforts, and actions are used to infer traits. The most widely accepted taxonomy of personality traits is the Big Five model. This



model consists on personality inventories which measures individual responses to certain circumstances, and consists on: Conscientiousness, Openness to Experience, Extraversion, Agreeableness, and Neuroticism.<sup>6</sup> These factors are obtained from conventional factor analysis in which the tests are measures of different domains of personality based on observer reports or self-report.<sup>7</sup> However, which measure of noncognitive skills is used in the empirical economic literature is often dictated by data availability (Brunello and Schlotter, 2011).

The relationship between personality traits and education has not received as much attention from economists as have personality effects on earnings and other labor market outcomes (Lundberg, 2013). Nonetheless, a certain consensus emerge on empirical studies in which personality traits related to Openness to Experience and Conscientiousness are important in determining how many years of education individuals complete in their lifetimes. Heckman et al. (2011) identify behaviors that have strong correlations with conscientiousness and agreeableness which in turn affect educational choices and adult outcomes. Locus of control and self-esteem (Two traits related to Neuroticism) play a particularly important role for adolescent schooling decisions (Heckman, Stixrud and Urzua, 2006).<sup>8</sup> Their effects differ across schooling levels, suggesting that analysts should be wary of using years of schooling attained as the outcome variable but should use the probability of attainment at different grades. Attention and early aggression, traits related to Conscientiousness and Agreeableness are also predictive (Almlund et al., 2011). -

In general, these studies find that both cognitive and noncognitive abilities play a role in different individual outcomes. Moreover, this literature recognize the importance of accounting for multiple periods in the life cycle of childhood and adulthood and the existence of critical and sensitive periods of childhood in the formation of skills, and different roles played by cognitive and socioemotional abilities across an individual life cycle (Heckman and Mosso, 2014). For instance, parental inputs have different effects at different stages of the child's life cycle with cognitive skills affected more at early

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<sup>6</sup> See Table 1.3 (p45) in Almlund et al. (2011) for a comprehensive definition of the Big Five Domains, facets and related traits.

<sup>7</sup> The Big Five model is not without its critics. The main ones stress that the model is atheoretical; omits individual's motivation (what people value or desire), while other psychologists suggest that the categories are too crude to be useful; or the lack of consensus among researchers about identifying and organizing lower order facets of the Big Five factors (Almlund et al., 2011).

<sup>8</sup> Locus of control is defined as the degree to which an individual perceives success or failure as being dependant on one's own action. Self-reported measures of self-esteem refer to an individual's subjective estimation of her own worth.

ages and noncognitive skills affected more at later ages (Cunha and Heckman, 2008). In turn, both cognitive and noncognitive skills can be shaped by interventions and that they are effective margins for social policy (see Heckman and Mosso, 2014, Heckman, Pinto, and Savelyev 2013).

### 3. The Uruguayan Educational System

The educational system is organized in four levels: pre-school, primary education (grades 1-6, with theoretical ages 6 to 11), secondary level which includes lower high school (*Ciclo básico*, grades 7 to 9, theoretical ages 12-14) and upper high school (*Bachillerato*, grades 10 to 12, theoretical ages 15-17); and tertiary level (college and teaching training institutes). Primary and lower high school are compulsory.<sup>9</sup> Lower and upper high school are offered in both *liceos* (non-vocational secondary schools), and in vocational schools (*UTUs*). It is worth noting that the different schooling stages are both public and privately provided (see Figure 1 in the Appendix).

Some main features that characterize the educational system in Uruguay are provided in Table A.1 in the Appendix. In particular, it is highlighted the great proportion of population aged 12 to 29 who is or was enrolled in a public institution at different levels of schooling stages. Also, it is important to notice that the proportion of students in a private institution increases for higher levels of education. Second, students mainly choose to attain general education institutions (*Liceos* or *Bachilleratos*), while this proportion is higher for females than males, possible explained by the type of education received in the different institutions.

The educational system shows some caveats. First, while enrolment in primary school is timely, and completion of primary education almost universal, the system is unable to retain a large share of students in lower and upper high school. Table A.2 in the Appendix shows schooling progression by gender and race for the population aged 20 to 29. It is worth noting the low proportion of young people with complete lower high school or complete upper high school, and is striking the differences between afro and non afro-descendants. In particular, 5% of afro-descendent males and 13.7% of afro descendant women have complete secondary education, compared to 28.8% and 36.4% for non afro-descendant men and women respectively (Table A.2 in the Appendix).

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<sup>9</sup> Since 2008 upper high school and pre-school are compulsory. Ley General de Educación No. 18.347

Second, it is worth noting the low supply of tertiary education provision in the Interior of the country.<sup>10</sup> The main college in Uruguay is the Universidad de la República (UdelaR), which is publicly provided, individuals do not have to pay any fee or pass any entrance test. But the UdelaR is mainly located in Montevideo, the capital of Uruguay, so students wanting to enroll in college and not living in Montevideo need to migrate to the capital. Also private colleges are mainly located in Montevideo. This may prevent many students without financial family support to access to college.<sup>11</sup>

#### **4. Methodological framework**

This analysis attempts to answer the following questions: i) to what extent parental education influence on education attainment? and, ii) is there any differential effect of parental background, individual's race, and cognitive and noncognitive abilities at different stages of schooling transition?

In order to answer these questions, the estimation strategy follows Cameron and Heckman (1998, 2001) in which education attainment is analyzed through a dynamic discrete choice model of schooling progression. This strategy recognizes that schooling attainment is the outcome of previous educational choices, which in turn depends on both observed and unobserved individual variables. The probability that an individual enters post-secondary education depends on upper high school graduation, which in turn depends on completing lower high school. Therefore, the model is fundamentally recursive. Thus, individuals enrolled in any schooling stage is a selected sample of those surviving the previous stage, making important to control for the effects of such educational selectivity to isolate the causal effects of family background on education attainment.

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<sup>10</sup> *Interior* is commonly used to identify the regions of the country excluding Montevideo, the capital of Uruguay, and includes 18 Departments.

<sup>11</sup> It is worth mentioning that since 2007 the UdelaR has been making great efforts in terms of territorial decentralization in order to give major opportunities to those students living in the Interior of the country. Also, some private universities are starting to locate in different regions of the country. But this process does not cover all the career options provided in Montevideo.

#### 4.1 A sequential model of schooling progression

Following Cameron and Heckman (2001) the model assumes that each individual make schooling decision based on a sequential choice model. The choices available to the individual are limited by their earlier schooling choices.

The expected utility derived from each educational level is modeled as a latent utility index  $y_s^*$ :

$$y_{is}^* = X'_{is}\beta_s + \alpha_s\theta_i + u_{is} \quad i = 1, \dots, N; \quad s = 1, \dots, S$$

where  $X_{is}$  is a vector of observed constraint and expectation variables relevant to schooling decision  $s$ ,  $\theta_i$  are unobserved factors for the econometrician but known to the agent. This is the source of the essential heterogeneity, which can reflect ability or motivation, while  $u_{is}$  represents an idiosyncratic error term which is assumed to be independent of the explanatory variables ( $X_{is}$  and  $\theta_i$ ) and is independent across individuals. Also, it is assumed that:  $u_{is} \sim N(0,1)$

Then, I can define the binary outcome  $y_{is} = \begin{cases} 1 & \text{if } y_{is}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$

These assumptions allows writing down the probability of making choice  $s$  as a probit model. Conditioning on  $\theta$ ,

$$\Pr(y_{is} = 1 \mid X_{is}, \theta_i, y_{is-1}) = \Phi(X'_{is}\beta_s + \alpha_s\theta_i)$$

where  $y_{is-1}$  are the past decisions made by the individual  $i$ .

Then, the probability of any sequence of schooling choices made by the individual  $y_{is}$  given the observed variables and  $\theta_i$  as:

$$\prod_{s \in C_i} [\Pr(y_{is} = 1 \mid X_{is}, \theta_i, y_{is-1})]^{y_{is}} [\Pr(y_{is} = 0 \mid X_{is}, \theta_i, y_{is-1})]^{1-y_{is}}$$

where  $C_i$  is the set of decision nodes that individual  $i$  has visited.

## 4.2 Empirical strategy

In this study, I consider three educational levels for girls and boys separately: lower high school ( $y_{i1}$ ), upper high school ( $y_{i2}$ ) and postsecondary level ( $y_{i3}$ ). Then, the sequential process for individual  $i$  consist on: first decide whether or not to complete lower high school level based on the underlying and unobserved expected utility ( $y_{i1}^*$ ). After completing lower high school, the individual decide whether or not to complete from upper high school ( $y_2$ ) conditional on the expected utility ( $y_{i2}^*$ ). Finally, for those graduating from upper high school, the individual choose whether or not to enroll in postsecondary education ( $y_3$ ) conditional on the expected utility derived from this election ( $y_{i3}^*$ ).

The sequence of life cycle schooling histories can be written as follows:

$$s=\{1, 2, 3\}$$

$$y_{i1} = \begin{cases} 1 & \text{or completing lower high school if } y_{i1}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

For those individuals completing lower high school,

$$y_{i2} = \begin{cases} 1 & \text{or completing upper high school if } y_{i2}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Finally, for those individuals graduating for upper high school

$$y_{i3} = \begin{cases} 1 & \text{or enrolled in postsecondary if } y_{i3}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Given the two levels of selection and the outcomes we have four types of observations:

- Those who choose not to complete lower high school  $y_{i1} = 0$
- Those who complete lower high school but decide not to continue upper high school  $y_{i1} = 1, y_{i2} = 0$
- Those who complete upper high school but decide not to enroll in postsecondary education:  $y_{i1} = 1, y_{i2} = 1, y_{i3} = 0$
- Those who decide to enroll in postsecondary education:  $y_{i1} = 1, y_{i2} = 1, y_{i3} = 1$

Then, for each of the educational levels stated before, the conditional probabilities are:

$$\text{Not completing lower high school: } \Pr(y_{i1} = 0 | X_{i1}, \theta_i) = 1 - \Phi(X_{i1}'\beta_1 + \alpha_1\theta_i)$$

Completing lower high school and not continue:

$$\Pr(y_{i1} = 1 | X_{i1}, \theta_i) = \Phi(X'_{i1}\beta_1 + \alpha_1\theta_i)$$

Not completing upper high school:

$$\Pr(y_{i2} = 0 | X_{i2}, y_{i1}, \theta_i) = \Phi(X'_{i1}\beta_1 + \alpha_1\theta_i) - \Phi_2(X'_{i1}\beta_1 + \alpha_1\theta_i, X'_{i2}\beta_2 + \alpha_2\theta_i, \rho_{12})$$

Completing upper high school and drop-out the educational system:

$$\Pr(y_{i2} = 1 | X_{i2}, y_{i1}, \theta_i) = \Phi_2(X'_{i2}\beta_2 + \alpha_2\theta_i, X'_{i1}\beta_1 + \alpha_1\theta_i, \rho_{12}) - \Phi_3(X'_{i1}\beta_1 + \alpha_1\theta_i, X'_{i2}\beta_2 + \alpha_2\theta_i, X'_{i3}\beta_3 + \alpha_3\theta_i, \rho_{12}, \rho_{13}, \rho_{23})$$

Being enrolled in postsecondary education:

$$\begin{aligned} \Pr(y_{i3} = 1 | X_{i3}, y_{i2}, \theta_i) \\ = \Phi_3(X'_{i1}\beta_1 + \alpha_1\theta_i, X'_{i2}\beta_2 + \alpha_2\theta_i, X'_{i3}\beta_3 + \alpha_3\theta_i, \rho_{12}, \rho_{13}, \rho_{23}) \end{aligned}$$

where  $\Phi(\cdot)$  is the standard normal cumulative distribution function,  $\Phi_2(\cdot)$  is the bivariate standard normal cumulative distribution with correlation coefficient  $\rho_{12}$  and  $\Phi_3(\cdot)$  is the trivariate standard normal cumulative distribution with correlation coefficients  $\rho_{12}, \rho_{13}, \rho_{23}$ .

$$\rho_{12} = cov[u_1, u_2 | X_1, X_2], \quad \rho_{13} = cov[u_1, u_3 | X_1, X_3], \quad \rho_{23} = cov[u_2, u_3 | X_2, X_3]$$

The model is estimated using maximum-likelihood technique of the joint trivariate sample selection model.

### 4.3 Identification

In order to be identifiable, the model requires that certain variables included in the alternative equations are stage-variant, that is regressors affecting the probability of completing a certain educational level but do not directly influence the probability of graduating the next educational level.

In this analysis, as is standard in the literature, I use as exclusion restriction stage-variant regressors, such type of institution attended in each educational level, , labor market conditions at each stage, and track chosen by the individual. These

variables are supposed to affect an individual's probability of completing one stage but not directly affecting the likelihood of finishing the next stage.

## 5. Data and descriptive statistics

This study uses the National Youth Survey (*ENAJ, Encuesta Nacional de Adolescencia y Juventud*), a cross-sectional national representative survey on adolescence and youth conducted in 2008 by the Uruguayan National Statistics Institute (*Instituto Nacional de Estadística*). The survey universe consists on all adolescents and young Uruguayans between 12 and 29 years living in cities with more than 5,000 inhabitants. In total the original survey comprises 4,993 individuals. The sample is based on the same households interviewed in the Continuous Household Survey (ECH) for 2008, and then being possible to merge the information from both surveys.

The ECH is one of the main statistical information surveys in the country providing socioeconomic information at the Department level, Montevideo and rest of the country (commonly named *Interior*, containing 18 Departments).<sup>12</sup> It offers detailed information on socio-demographic characteristics, migration experience, labor market participation, experience, and conditions; among others. The ENAJ incorporate a vast information about other aspects of the respondents lives, such as education achievement, fertility, participation in crime, health auto perception, family background (mother and father education), alcohol and substance use, migration, first job characteristics, participation in social and political organizations.

Although the survey is not longitudinal, it contains retrospective information allowing me to construct educational trajectories, as well as past performance in the educational system (repetition in primary and secondary level), motives for attending secondary level, and risky behaviors of interest (such as drugs consumption). Moreover, the ENAJ complement ECH in the sense that the last one suffers from major limitations of special importance to the analyses of the role of family background on college enrollment decisions.

The original sample is restricted for individuals aged 20 to 29, theoretical ages for which individuals are supposed to have completed at least secondary education. This restriction enables me to observe different educational transitions since the child enters

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<sup>12</sup> A Department is a first-level political and administrative division of Uruguay.

the educational system until the higher attained level. After excluding observations with missing data on key interest variables, I obtain a final sample of 2,349 individuals.

## 5.1 Explanatory variables

For a given level of schooling, the probability of school progression from one level to the next higher level depends not only on the school performance of the child, but also on the child's noncognitive ability, on factors affecting parental investment in child schooling, including parental resources and preferences (which is closely related to returns to and opportunity costs of schooling), and also the community characteristics defining local health/education/employment environment.

The variables included in the analysis are: race, parental educational background (both mother and father highest educational level attained), age cohort fixed effects, regional fixed effects<sup>13</sup>, a dummy variables indicating whether the child attended or not to pre-school, and the type of institution attended in primary level. In order to capture individuals' cognitive ability, grade repetition in educational level is incorporated in the analysis. Specifically, I consider whether the child never repeated, repeated once or more than once in primary level. When considering the probability of completing upper high school or the probability of enrollment in postsecondary education, I also consider whether the individual never repeated, repeated once, or more than once in secondary level.<sup>14</sup>

In addition, two variables are used in order to proxy noncognitive abilities. First, I consider a dummy variable equal to one if the individual has tried marijuana before age 15. This risky behavior has been found in the literature to be related to personality traits, which in turn negatively influence education attainment. For instance, Gullone and Moore (2000) study the relationship between personality traits and adolescent risky behavior. The authors identify different categories of risky behaviors: rebellious and reckless risk-taking.<sup>15</sup> Both of these behaviors had highly correlated with consciousness, which greatly influence on schooling progression. Heckman et al. (2011) identify five

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<sup>13</sup> Residential location variables when attending to each education level (at the Department level) are included, which may suggest the quality of local public services, e.g., health/education/employment, in different Departments.

<sup>14</sup> Information on repetition in secondary is only provided for the whole educational level, not differentiating between repetitions in lower or upper high school.

<sup>15</sup> Examples of rebellious risk-taking are drinking, smoking, and staying out at night. Examples of reckless risk-taking are drinking and driving, having unprotected sex, and speeding.



risky behavior: violent behavior in 1979 (fighting at school or work and hitting or threatening to hit someone), tried marijuana before age 15, daily smoking before age 15, regular drinking before age 15, and any intercourse before age 15 as measures of socio-emotional factor.

A second variable considered is the motivation for enrollment in secondary level. The coded options given to this question are described in Table A.3 in the Appendix. Based on the alternative responses given to this question, I categorize the enrollment motives as: high motivation (those individuals reporting high value of education), labor motives (individuals declaring enrollment meantime they find a job), and not motivated (individuals declaring enrollment because they were “pushed to”). One of the main critics received by the Big Five Model is that the model is silent about motivation. However, Almlund et al. (2011) point that sometimes academic motivation is related to Openness to Experience (p136). I expect that those most motivated individuals are the most likely to complete lower and upper high school, in comparison to those who are less motivated to acquire education.

The rest of the regressors included in the analysis are stage variant covariates. First, I consider the type of institution attended in different levels of high school. Public institution (both in lower or upper high school) is a dummy variable equal to one if the individual completed all grades of the corresponding level in a public institution and zero otherwise (those with at least one grade attending to a private institution). In general, the choice of a school, e.g., a private (fee paying) school, may reflect parental motivation to produce children of better quality (i.e., with higher schooling). However, for a given level of parental education, it may also account for the quality of services provided by public/private schools.

Also, the track chosen in secondary level is considered. While in lower high school no significant differences in curricula between general education and vocational training education, for upper high school differences turns to be important. Vocational training education is more oriented toward job placement (but also is possible to continue to tertiary education) than general academic education.

Labor market variables are included in order to capture the non-monetary opportunity cost of education. For each level of the schooling stage I consider unemployment and employment youth rates. Alternative employment rates are considered. When the child (or their parents) is choosing whether to complete or not lower high school, the opportunity cost of education considers the unskilled

employment rate. For children choosing between completing upper high school or dropping-out, I consider semi-skilled employment rate. For postsecondary enrollment, the skilled employment rate is considered.<sup>16</sup> Unemployment and employment rates are calculated for young people (aged 24 or less years old), by gender and at the department level at theoretical ages in which the individual is supposed to be enrolled in each schooling stage. These rates would be exogenous to schooling decisions and may account for effects of opportunity costs of schooling at different levels.

Finally, internal migration is considered for postsecondary enrollment. As was stated before, universities in Uruguay (both public and private ones) are mainly located in Montevideo, so those individuals with financial family support are more likely to migrate to Montevideo and to attend to university than those without family resources. Motives for migration is a categorical variable that captures whether the individual did not migrate after completing secondary level, if migrated for study motives, or migrated for other motives.<sup>17</sup>

Detailed information on the elaboration and classification of the variables are provided in Table A.3, while a summary of the independent variables considered in this analysis are provided in Tables A.4 and A.5 in the Appendix.

## 5.2 Descriptive analysis

Table 1 provides summary statistics of the final sample. More than half of the sample is female (52%), while the proportion of afro-descendants is 11% of the total sample. As can be seen, more than 80% of the individuals were enrolled in pre-school level. While no differences in this rate are observed between women and men, the gap between non-afro and afro descendants is almost 10%.

Primary education level is almost universal (98% of the total sample completes this level). A big concern is related to the high repetition rates observed in the total sample. On average 25% of the individuals fail at least once in primary level. This difference is higher if afro and non-afro descendants are compared, afro students

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<sup>16</sup> Unskilled employment considers the total employment of workers with less than 9 years of education; semiskilled workers are those with 9 and less than 12 years of education; and skilled workers are those with 12 or more years of education.

<sup>17</sup> Other motives for migration are mainly labor, health, and family motives declared for migration.

repetition rates almost doubles non-afro descendants (41% and 22% respectively).<sup>18</sup> Also, females perform better than males in primary level. Most individuals attended the 6 grades in public schools (77%), being higher for afro-descendant students (86%).

Also, differences with respect to parental background composition are observed between afro and non-afro descendants. For instance, the proportion of non-afro descendants with high educated parents (more than 12 years) doubles afro-descendants rate, while the proportion of afro-descendants with low educated parents is 20% higher than for non-afro-descendants.

Tables 2 and 3 present summary statistics for different schooling levels for girls and boys respectively. Some observations can be made from these tables.

First, it is seen that the proportion of children dropping out each educational level are mainly from lower parental backgrounds. More than 70% of the leavers in lower high school are from a disadvantaged parental background. Also, while the proportion of students from disadvantaged parental background enrolled decreases for higher levels of the educational path; the proportion of children from better-off parental educational background completing lower and upper high school and enrolled in postsecondary increases. The proportion of children from medium parental background enrolled and completing each level is stable across the educational path.

Second, afro-descendants are more likely to drop-out in lower and upper high school than non afro-descendants. Especially for girls, the proportion of afro-descendants that drops-out in each stage more than doubles the proportion of those enrolled in each level. Third, past performance in primary and secondary level seems to prevent students to attain higher levels of education. Note that the proportion of students enrolled in postsecondary education who have repeated primary is almost zero for both genders.

Differences across genders arise when observing the proportion of repeaters in secondary level who are enrolled in postsecondary. Note that the rate of repeater girls enrolled in postsecondary is almost half the rate observed for boys (13 and 24pp respectively). Relative to noncognitive abilities, it is observed that the proportion of boys who drop-out lower high school with a risky behavior (tried marijuana before age

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<sup>18</sup> Afro-descendance is captured in the ECH through the following question: “Do you believe you have... (black or afro, Asian, white, native, other) descent?”. The respondent can choose more than one option of racial descent. For this study, individuals reporting having black or afro descent are classified as afro-descendants. Non-afro descendants are all individuals reporting not having afro-descent (thus, including whites, Asian, native or other). It is worth noting that almost 90% declares *only* white descent, while less than 5% declares having native or other descent.

15) is almost twice that of girls (9.5pp for boys and 4.9pp for girls). Students that highly value education, those more motivated to participate in secondary level, are the ones that on average completes the different high school levels, while the opposite is observed for the not motivated ones, its weight increases when observing the leavers in comparison to those enrolled in different schooling levels. Finally, a great proportion of students dropping-out the educational system are mainly those who attended all grade years of each stage in a public institution.

## **6. Results**

In this section I describe the implications of the estimates of the model by discussing in the following order, (1) the determinants of the probability of the initial schooling stage, (2) the determinants of upper high school transitions for those who completed lower high school, (3) the postsecondary enrollment decision for those surviving previous schooling stages (subsection 6.1). Next, subsection 6.2 gives a more complete picture of the educational path for boys and girls living in Uruguay.

### **6.1 Empirical findings**

A trivariate probit model with sample selection is estimated separately for females and males. Average marginal effects capturing direct effects of the key variables of this study are presented in Tables 4 and 5.<sup>19</sup>

First, the role of parental education in explaining the probability of completing lower high school is seen to be an important factor for both girls and boys. Indeed, for both genders, the probability of completing lower high school increases with the educational level of their parents. For instance, the likelihood of attaining this educational level for a child with highly educated parents more than doubles the probability of those with medium educated parents. For girls, the education of the mother is more important than the education of the father for attaining this level of education, while for boys the effects are similar. Girls with a high educated mother are

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<sup>19</sup> Alternative specifications were also estimated not showing significant differences with the coefficients presented in Tables 4 and 5. These estimations included interactions of: race and parental educational background; race and motivation; motivation and parental education; repetition in both secondary and primary with motivation; parental education and repetition; and repetition and race. None of these interaction were statistical significant.

almost 12 percentage points (pp) more likely to complete this level in comparison with a girl with a low educated mother. In turn, having a medium educated mother increase the likelihood of completing this level in 5.7pp in comparison to a girl from a lower parental education background. For boys, the gaps are higher. Those from better of parental educational backgrounds are almost 19pp more likely to complete lower high school, while those with a medium educated mother or father are 5.7 and 4pp respectively more prone to attain this level than a boy from a more disadvantaged parental education.

Cognitive ability proxied by repetition in primary level decreases the probability of graduating from lower high school. While for boys the biggest marginal effect of parental education (mother with high education, 18.9 pp) is greater than the effect of repeating once or more than once (10.5 and 15.1 pp respectively), for girls the opposite result is observed (11.8pp for having a high educated mother and 16.4pp for having repeated more than once). One possible interpretation is that parents prefer to give a “second chance” in the educational system to less able boys rather than to less able girls, who have higher chances to drop-out at this education level.

In line with the literature, I find that more motivated individuals are more likely to complete lower high school. Specifically, girls and boys declaring enrollment in secondary level because they were “forced to”, are less likely to complete this level in comparison to those declaring high value of education (13.9 and 10.3 pp respectively). Also, girls and boys declaring labor motives for enrollment in secondary are more likely to drop-out this level than those more motivated children (4.2 and 8.3 pp respectively). It is worth noting that for girls (in comparison to boys) both cognitive and noncognitive abilities are more important than having a high educated mother in the probability of completing this level.

In addition, afro-descendant girls are less likely to complete this educational level than non afro-descendants (5.1pp at 95% of confidence). For boys, race is not a significant factor for attaining this level.

Next, the type of institution attended during primary level and lower high school decreases the probability of successfully completing this level. Specifically, individuals attending all grades in a public institution have lesser chances to complete this level than those with at least one year in a private institution (8.3pp and 11.1pp for girls, and 16 and 7.5pp for boys, respectively for school and lower high school).

Despite the heterogeneity in the quality across public and private institutions that could be found in Uruguay, the public ones are associated with lower quality, in terms of resources, number of students per teacher, etc., in comparison to private ones. An alternative explanation is that private schools (mainly religious ones) are more effective in producing more motivated students and self-disciplined students (Coleman and Hoffer, 1983).<sup>20</sup>

It is worth mentioning that persistent effects of pre-school attendance are observed for girls (5.3pp), while this effect vanishes for males. Despite giving an interpretation of this result is out of the scope of this paper, a possible explanation is given in Apps et al. (2013). These authors stress that this result is quite common in the international literature, and may be due to strong effect from improved language skills (usually higher in girls), combined with the lower impact of negative behaviors (like aggressiveness, and antisocial behaviors) which are more common in boys (p.194).

Labor market opportunities play an important role on the probability of exiting the education system.<sup>21</sup> For girls, higher unemployment rate decreases the probability of completing lower high school. This effect could be reflecting girls' future expectations on labor market. If girls perceive that the labor market does not provide great opportunities, then they are discouraged to invest in human capital, thus dropping-out the system. For men, higher opportunities for unskilled workers increase the probability of dropping out the educational system. Both variables, which measures opportunity cost of education, could be also measuring short-run family resources constraints. Thus, when lack of resources in the household are observed, children are more prone to drop-out the educational system in order to complement family's income. Also, that this effect is greater for boys than girls, probably reflecting gender roles within the household. When the household is facing financial constraints, boys are preferred than girls to participate in the labor market, possibly because they are more likely to obtain higher wages than girls.

Next, I move on to analyze the determinants of upper high school attainment for those surviving previous schooling stage (column 2 in Tables 4 and 5). It is observed a great impact of parental education on educational level's completion. Children with high educated parents show higher probability of graduating secondary level. Boys with medium educated fathers and girls with medium educated mothers are more likely to

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<sup>20</sup> Quoted in Carneiro and Heckman (2003) p.39.

<sup>21</sup> Legal age for participating in the labor market is 14 years old in Uruguay.

complete this level in comparison to those with less educated parents (7 and 5.5pp for boys and girls respectively). Also, individuals with high educated parents have greater chances to graduate than those with less educated parents. For girls, having a high educated mother or father increase the probability of completing upper high school in comparison to girls with a more disadvantaged parental background (16.8 and 11.6pp respectively). Boys with a medium or high educated father are respectively 7 and 13.6pp more prone to complete this level than those children with low educated fathers. A common feature observed across genders is that the opportunity educational gap across individuals with different parental education background increases in this educational stage. Thus, the educational system turns more deterring for boys and girls from medium and low parental educational level.

Second, afro-descendants are more likely to drop-out upper high school in comparison to non afro-descendant students. If we compare the marginal effect of being an afro-descendant on the probability of completing the first and second transitions, it is observed that for girls this coefficient doubles its effect in comparison to the previous stage (5.1 and 9.4pp respectively), at the time that for boys, race is now negative and statistically significant (13pp).

Past performance in secondary level is the most important factor in explaining students' probability of dropping-out. Having repeated once increase the probability of dropping-out in 25 and almost 30 pp respectively for girls and boys; while students repeating more than once are 34.5pp and 37 pp (girls and boys respectively) less prone to graduate from upper high school. Also, having repeated once in primary school decreases the probability of completing upper high school (14.3 and 18.7pp for girls and boys respectively). This result shows persistent effects of past performance in primary on higher level's attainment in the educational system. Consistent with Cameron and Heckman (2001), differences in cognitive ability appears at early ages and persist over time.

Different socioemotional factors are explaining upper high school completion across genders. For instance, non-statistical and significant effects of risky behavior on upper high school completion are observed for girls. Conversely for boys, this effect is negative and statistically significant (almost 18pp significant at 95%). Motivation for enrollment still explains girls' success in attaining upper high school. Girls who reported having been "forced" to attend secondary level are 15.6pp less likely to complete upper high school than more motivated girls.

Girls who attended all grades into a public institution in upper high school are 6.2 pp less likely to completing upper high school, while no statistical and significant effect is observed for boys. Also, students (or their parents) choosing a general academic track are more likely to survive this educational stage than those tracked in vocational training education or those with mixed tracks (those who have changed between tracks within upper high school). This could be seen as boys and girls self-selecting between tracks, where the more able or motivated ones choose to be enrolled in academic track, while less able ones choose alternative tracks.

Higher semi-skilled employment rate when the individual is 15 years old (the theoretical age for attaining first grade in upper high school) decreases the probability of completing this level in 5.3pp for males. In turn, higher unemployment rate when girls are aged 15, increase in 2.8pp the probability of dropping-out the system. Thus, favorable labor market conditions for semiskilled workers increase the opportunity cost of education for boys, while less attractive labor market conditions decrease the opportunity cost of schooling for girls.

Finally, the determinants of postsecondary enrollment are analyzed for those students surviving previous schooling level (column 3 in Tables 4 and 5). Two main variables explain participation in postsecondary education for boys and girls. First, boys from medium and high parental educational background are more likely to continue postsecondary education (14.1 and 35.6pp, respectively). In turn, only girls with a high educated father are likely to be enrolled in postsecondary education (8.6pp at 10% of significance), thus preventing girls from lower and medium parental background to enroll in postsecondary education. Second, students declaring study motives for internal migration are more prone to be enrolled in this educational stage in comparison to those not migrating (13.1 and 20pp for girls and boys, respectively). Study motives declared for migration could be a proxy of household permanent income. As was stated in Section 3, postsecondary institutions, mainly the public University (UdelaR) and private universities are located in Montevideo, so students not living in the capital and wanting to continue college should move to the capital, assuming all the related costs of this decision, like housing, food, etc. In other words, families with financial resources are more likely to invest in their children postsecondary education.

It is also worth mentioning that neither race nor past performance in primary and secondary level, are important direct determinants of postsecondary enrollment for any gender. This could be explained because a great proportion of them did not “survive”



the previous stage and that almost all who survive are enrolled in postsecondary level. This is also consistent with the descriptive analysis presented in Section 5.

## **6.2 Interpretation of results**

Overall, the schooling transition for girls and boys are mainly influenced by long run family factors: parental education, race, and cognitive and noncognitive abilities. However, the results show different effects of our key variables across the educational path for girls and boys. This subsection describes the main findings of this study characterizing the educational path for girls and boys separately.

The schooling transition for girls can be characterized by highly determined by their family background. Indeed, parental background factors, such as parental education level, past performance in primary level, motivation reported for attending secondary level, race and parental choices in terms of pre-school enrollment and types of institution attended in primary and lower high school, play a major role in explaining lower high school attainment.

In the next high educational level, the system becomes more unequal in terms of educational opportunities for girls who performed worth, from less advantaged parental educational background and for afro-descendant girls. First, it is observed that the opportunity gap of completion for girls with different scholastic abilities increases in comparison to previous stages. Second, the system turns more unequal in terms of opportunity gap between girls with a high educated mother or father in comparison to girls from a less advantaged parental background. This is observed when comparing the marginal effects of different educational background on the probability of completing this level. Also, girls with a high educated parent (mother or father) are more likely to graduate from high school than in the previous educational level, while the marginal effect of being from a medium parental educational background decreases its significance. Motivation is still an important factor fostering schooling progression, but is less significant than in the previous stage.

Finally, for those girls who survived previous stages (mainly non afro descendants, more able and with better-off parental educational background), enrollment in postsecondary level is almost determined by the possibility to migrate and to less extent, for those having a high educated father. Therefore, the highest we move

in the educational system, the most unequal the system becomes more unequal in terms of opportunity given to girls from different parental backgrounds.

Similar patterns are observed in the schooling transitions for boys. The more we advance in the educational path, the lesser boys from disadvantaged parental background have a chance to attain higher educational levels. Also, opportunity cost of education increases for higher educational level. Some differences across genders are observed. For instance, the system seems to turn more unequal in terms of opportunities given for girls than those for boys. While in upper high school the gap between students from different parental backgrounds increases in comparison to previous level in a similar way across genders, postsecondary level excludes girls from medium and low parental educational backgrounds. Conversely, boys with medium educated fathers surviving previous educational stage are more likely to be enrolled in postsecondary than those from more disadvantaged parental backgrounds.

Second, race has a major role in preventing girls from graduating lower and upper high school than for boys. Finally, socioemotional abilities proxied by motivation and risky behavior show different effect across genders. While for girls motivation is an important factor deterring girls schooling progression, for boys' motivation is important for completing lower high school while risky behavior plays a role in explaining upper high school graduation.

The results summarized above are consistent with the recent literature that highlights the importance of individuals' multiple abilities across one individual's life cycle. This literature stress that cognitive ability are determined early in life while noncognitive ability are more malleable later in life. Specifically, Heckman and Carneiro (2003) point out that cognitive ability is formed relatively early in life and becomes less malleable at later stages of child's development. According to these authors, by age 14, intelligence as measured by IQ tests seems to be fairly well set. Noncognitive skills, in turn appear to be more malleable until the late adolescent years (Heckman and Mosso, 2014). Despite the scarce empirical evidence on the development of noncognitive abilities, some evidence stress that institutional schooling settings such as the role of teachers, the institutional design of education systems, contribute to the formation of noncognitive skills (Brunello and Schlotter, 2011).

Measured scholastic ability and noncognitive ability is influenced by long-term family and environmental factors, which are in turn produced by the long permanent income of families. Heckman and coauthors (Carneiro and Heckman, 2003; Heckman

and Mozzo, 2014) refer to long run family factors which are crystallized in parental educational background, but also in scholastic and socioemotional abilities, in turn produced by the long permanent income of families which are the driving force behind schooling attainment, and not short-term credit constraints

In this study, because of lack of data on family's income or wealth data at the time of schooling choices are made, the effect of family income is not directly tested. In order to overcome this issue, labor market variables are introduced in the analysis. In line with Cameron and Heckman (2001) and Carneiro and Heckman (2003) who find that short-term family income are more important for high school drop-out and completion decision than for the college enrollment decision, I find that the opportunity cost of education is significant and increases in the transition from lower to upper high school, but (in line with these authors) plays a minor role in comparison to long-term family background in this stages.

Finally, as was mentioned before, the public University (UdelaR) has being making big efforts in terms of territorial decentralization since 2007. These actions could indeed have a positive effect in terms of access to postsecondary education for students from middle educational background in the Interior of Uruguay. However, in order to take full advantages of these institutional efforts, and to be inclusive in terms of less advantaged children, public interventions in secondary level are mandatory. In particular, policies intended to improve the environment that shape child's multiple abilities at different levels of the educational path will be more effective in increasing schooling progression in the long run.

## **7. Concluding remarks**

In this paper, I analyzed to what extent parental characteristics influence on the child's schooling progression. By analyzing the impact of parental educational background, race and multiple abilities, stage by stage of the educational path, different roles of the variables of interest are observed, providing a more complete overview of the factors preventing schooling progression in Uruguay.

For the purpose of the paper, I used the National Youth Survey which provides information on education achievement and performance across the educational path, among other information. In particular, this survey overcomes the Household National

Survey by providing information on parental education for individuals not living in the household of origin.

The empirical strategy considers a sequential probability model developed by Cameron and Heckman (1998, 2001) in which schooling attainment is modeled as the outcomes of sequential choices made at each educational level, individuals' unobserved heterogeneity and alternative schooling cost of attendance at different levels.

This study shows major shortcomings in the Uruguayan educational system particularly in lower and upper high school which in turn, affect individual's enrollment in postsecondary education. Deficiencies in the secondary level were previously addressed in other studies and technical reports (Aristimuño, 2009; Manacorda, 2008; among others.). The results presented in this study sheds more light on the different factors preventing child's schooling progression by analyzing the influence of alternative variables at each step of the educational path, thus giving a complete overview of the major caveats of the Uruguayan educational system.

The findings presented and discussed above gives support to policy interventions at different stages of schooling progression in order to level the field of play for children from different backgrounds. In particular, policies intended to promote cognitive ability early in life and social and behavioral skills in adolescence and youth, mainly focused on children from more disadvantaged environments -who probably receive little encouragement at home- should be explored. Finally, girls and boys develop alternative socioemotional abilities across their life cycle, which in turn influence differently schooling progression across genders. Also, race is an important factor preventing schooling transition for boys and girls. Thus, promoting cognitive and noncognitive abilities from a gender perspective and taking into account ethnical/ racial diversity can have positive effects on child's achievement of higher education.

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**Table 1 Summary statistics (%)**

<b>Variable</b>	<b>Total</b>	<b>Female</b>	<b>Male</b>	<b>No afro</b>	<b>Afro</b>
Female	0.52			51.7	57.4
Afro-descendant	0.11	0.12	0.09		
<i>Parents' background</i>					
<i>Mother's education</i>					
Low level	0.48	0.48	0.47	0.46	0.65
Medium level	0.37	0.36	0.37	0.38	0.28
High level	0.15	0.15	0.15	0.16	0.07
<i>Father's education</i>					
Low level	0.52	0.54	0.51	0.50	0.69
Medium level	0.36	0.35	0.38	0.37	0.27
High level	0.11	0.11	0.12	0.12	0.04
Attended pre-school	0.83	0.83	0.84	0.84	0.75
Completed primary level	0.98	0.98	0.97	0.98	0.95
Public school (all years)	0.77	0.77	0.77	0.76	0.87
<i>Performance in primary (Repeated)</i>					
Never	0.76	0.78	0.73	0.78	0.59
Once	0.18	0.16	0.19	0.16	0.27
More than once	0.07	0.05	0.08	0.06	0.14
Obs.	2,349	1,228	1,121	2,100	249

**Table 2 Summary statistics across the schooling progression for girls**

Variable	Lower highschool			Upper highschool			Post-secondary	
	Enrolled	Drop-out	Complete	Enrolled	Drop-out	Complete	Not enrolled	Enrolled
Afro	0.098	0.179	0.082	0.074	0.116	0.050	0.047	0.051
<i>Mother's edu level</i>								
Low	0.445	0.761	0.382	0.342	0.497	0.257	0.378	0.220
Medium	0.384	0.217	0.417	0.434	0.425	0.438	0.472	0.428
High	0.171	0.022	0.201	0.225	0.079	0.304	0.150	0.352
<i>Father's edu level</i>								
Low	0.508	0.728	0.464	0.435	0.562	0.366	0.504	0.323
Medium	0.372	0.255	0.395	0.411	0.373	0.431	0.394	0.443
High	0.121	0.016	0.142	0.155	0.065	0.203	0.102	0.235
Attended pre-school	0.853	0.685	0.886	0.894	0.849	0.918	0.890	0.927
Public school (all years)	0.749	0.967	0.706	0.681	0.798	0.618	0.748	0.577
<i>Performance in Primary</i>								
Never repeated	0.839	0.533	0.901	0.923	0.839	0.968	0.929	0.980
Repeated once	0.136	0.370	0.090	0.074	0.151	0.032	0.071	0.020
Repeated 2+	0.024	0.098	0.010	0.004	0.010	0.000	0.000	0.000
Noncognitive ability								
Tried marijuana before 15yr	0.025	0.049	0.021	0.021	0.027	0.017	0.016	0.017
<i>Motivation to enrollment</i>								
Highly motivated	0.778	0.571	0.819	0.835	0.784	0.862	0.819	0.875
Labor motives	0.060	0.174	0.037	0.030	0.058	0.015	0.016	0.015
Not motivated	0.139	0.201	0.126	0.118	0.140	0.106	0.134	0.098
Other motives	0.023	0.054	0.017	0.017	0.017	0.017	0.031	0.012
<i>Lower highschool vbles</i>								
Public	0.790	0.989	0.750	0.723	0.887	0.634	0.756	0.597
Private	0.184	0.000	0.221	0.245	0.075	0.338	0.205	0.379
General education (all grades)	0.884	0.701	0.920	0.950	0.901	0.978	0.961	0.983
Vocational training (UTU all grades)	0.071	0.185	0.049	0.030	0.058	0.015	0.024	0.012
<i>Upper highschool vbles</i>								
Public institution (all yr)				0.728	0.853	0.660	0.780	0.623
General education (all grades)				0.870	0.750	0.935	0.835	0.966
Vocational training (UTU all grades)								
<i>Performance in Secondary</i>								
Never repeated				0.647	0.336	0.817	0.661	0.866
Repeated once				0.229	0.401	0.136	0.252	0.100
Repeated 2+				0.123	0.264	0.047	0.087	0.034
<i>Migration motives (after highschool)</i>								
Not migrated							0.638	0.616
Other motives							0.291	0.154
Study							0.071	0.230
Obs.	1,109	184	925	828	292	536	127	409

**Table 3 Summary statistics across the schooling progression for boys**

Variable	Lower highschool			Upper highschool			Post-secondary	
	Enrolled	Drop-out	Complete	Enrolled	Drop-out	Complete	Not enrolled	Enrolled
Afro	0.089	0.150	0.073	0.067	0.098	0.040	0.060	0.031
<i>Mother's edu level</i>								
Low	0.432	0.740	0.355	0.320	0.404	0.248	0.410	0.176
Medium	0.400	0.250	0.437	0.453	0.459	0.449	0.436	0.454
High	0.168	0.010	0.207	0.227	0.138	0.303	0.154	0.370
<i>Father's edu level</i>								
Low	0.475	0.745	0.407	0.374	0.474	0.288	0.504	0.191
Medium	0.395	0.250	0.431	0.445	0.428	0.459	0.444	0.466
High	0.130	0.005	0.161	0.181	0.098	0.253	0.051	0.344
Attended pre-school	0.870	0.760	0.897	0.904	0.872	0.931	0.855	0.966
Public school (all years)	0.747	0.965	0.693	0.667	0.771	0.578	0.675	0.534
<i>Performance in Primary</i>								
Never repeated	0.789	0.520	0.856	0.890	0.810	0.958	0.897	0.985
Repeated once	0.172	0.370	0.123	0.102	0.174	0.040	0.103	0.011
Repeated 2+	0.039	0.110	0.021	0.008	0.015	0.003	0.000	0.004
<i>Noncognitive abilities</i>								
Tried marijuana before 15yr	0.058	0.095	0.048	0.048	0.073	0.026	0.009	0.034
<i>Motivation to enrollment</i>								
Highly motivated	0.73	0.57	0.77	0.78	0.75	0.80	0.79	0.81
Labor motives	0.09	0.16	0.07	0.06	0.07	0.04	0.08	0.03
Not motivated	0.14	0.19	0.12	0.12	0.13	0.12	0.10	0.13
Other motives	0.05	0.09	0.04	0.04	0.05	0.03	0.03	0.03
<i>Lower highschool vbles</i>								
Public	0.775	0.960	0.729	0.701	0.829	0.591	0.778	0.508
Private	0.188	0.010	0.232	0.263	0.131	0.377	0.197	0.458
General education (Liceo all grades)	0.772	0.500	0.840	0.875	0.801	0.939	0.846	0.981
Vocational training (UTU all grades)	0.130	0.230	0.106	0.088	0.138	0.045	0.120	0.011
<i>Upper highschool vbles</i>								
Public institution (all yr)				0.705	0.798	0.625	0.795	0.550
General education (Liceo all grades)				0.761	0.664	0.844	0.667	0.924
Vocational training (UTU all grades)								
<i>Performance in Secondary</i>								
Never repeated				0.545	0.324	0.736	0.675	0.763
Repeated once				0.252	0.346	0.172	0.205	0.156
Repeated 2+				0.203	0.330	0.092	0.120	0.080
<i>Migration motives (after highschool)</i>								
Not migrated							0.624	0.603
Other motives							0.085	0.248
Study							0.291	0.149
Obs.	1,005	200	805	706	327	379	117	262

**Table 4 Educational path (Girls) Average marginal effects**

Variables	Lower high-school (1)	Upper high-school (2)	Post-secondary (3)
Afro-descendants	-0.051** (0.021)	-0.094** (0.048)	0.104 (0.068)
<i>Parental education (Omitted: low level of education)</i>			
Mother's edu level medium	0.057*** (0.017)	0.055* (0.032)	-0.029 (0.035)
Mother's edu level high	0.118*** (0.034)	0.168*** (0.045)	0.039 (0.045)
Father's edu level medium	0.032** (0.016)	0.040 (0.030)	0.030 (0.033)
Father's edu level high	0.057 (0.045)	0.116** (0.048)	0.086* (0.049)
<i>Multiple abilities</i>			
<i>Omitted variables in repetition (Never repeated)</i>			
Repeated once school	-0.103*** (0.016)	-0.143*** (0.053)	-0.037 (0.084)
Repeated school 2+	-0.164*** (0.036)	.	.
Repeated once secondary	.	-0.251*** (0.027)	-0.047 (0.057)
Repeated secondary 2+	.	-0.345*** (0.036)	0.011 (0.080)
<i>Motives for enrollment in secondary (Omitted: highly motivated)</i>			
Not motivated	-0.139*** (0.025)	-0.156** (0.063)	-0.013 (0.098)
Labor motives	-0.042** (0.019)	-0.022 (0.040)	-0.027 (0.047)
Other motives	-0.082** (0.040)	0.009 (0.102)	-0.153 (0.100)
Marijuana before 15		-0.065 (0.100)	
<b>Stage-variant variables</b>			
<i>Lower high school</i>			
Public institution	-0.111*** (0.043)	.	.
Unemployment rate	-0.126** (0.058)	.	.
All years in public school	-0.083*** (0.029)	.	.
Attended pre-school	0.053*** (0.017)	.	.
<i>Upper high school</i>			
Public institution	.	-0.062* (0.032)	.
General education	.	0.208*** (0.038)	.
Unemployment rate_age15	.	0.283* (0.169)	.
Unemployment rate_age16	.	-0.146 (0.174)	.
<i>Postsecondary education</i>			
<i>Migration motives (Omitted variable: not migrated)</i>			
Motives for migration: studies	.	.	0.131** (0.052)
Other motives for migration	.	.	-0.060* (0.036)
Employment rate_skilled	.	.	0.546 (0.393)
Regional dummies			Yes all stages
Cohort age dummies			Yes all stages

Standard errors in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 5 Educational path (Boys) Average marginal effects**

Variables	Lower high-school (1)		Upper high-school (2)		Post-secondary (3)	
Afro-descendants	-0.020	(0.026)	-0.130*	(0.070)	-0.073	(0.094)
<i>Parental education (Omitted: low level of education)</i>						
Mother's edu level medium	0.057***	(0.017)	-0.014	(0.039)	0.010	(0.054)
Mother's edu level high	0.189***	(0.048)	0.051	(0.052)	0.084	(0.068)
Father's edu level medium	0.040**	(0.018)	0.070*	(0.037)	0.141***	(0.052)
Father's edu level high	0.187***	(0.065)	0.136**	(0.054)	0.356***	(0.078)
<i>Multiple abilities</i>						
<i>Omitted variables in repetition (Never repeated)</i>						
Repeated once school	-0.105***	(0.019)	-0.187***	(0.062)	-0.226	(0.137)
Repeated school 2+	-0.151***	(0.032)	-0.115	(0.237)	.	.
Repeated once secondary	.	.	-0.296***	(0.032)	0.004	(0.058)
Repeated secondary 2+	.	.	-0.373***	(0.036)	0.019	(0.088)
<i>Motives for enrollment in secondary (Omitted: highly motivated)</i>						
Not motivated	-0.103***	(0.025)	-0.004	(0.074)	.	.
Labor motives	-0.083***	(0.020)	0.003	(0.046)	.	.
Other motives	-0.085***	(0.031)	0.030	(0.082)	.	.
Marijuana before 15	.	.	-0.179**	(0.076)	0.198	(0.148)
<b>Stage- variant variables</b>						
<i>Lower high school</i>						
Public institution	-0.075*	(0.039)	.	.	.	.
Unskilled employment rate	-0.319***	(0.121)	.	.	.	.
All years in public school	-0.160***	(0.031)	.	.	.	.
Attended pre-school	0.032	(0.020)	.	.	.	.
<i>Upper high school</i>						
Public institution	.	.	-0.031	(0.037)	.	.
General education	.	.	0.192***	(0.038)	.	.
Semi-skilled Employment rate_age15	.	.	-0.527**	(0.257)	.	.
Semi-skilled Employment rate_age16	.	.	0.215	(0.261)	.	.
<i>Postsecondary education</i>						
<i>Migration motives (Omitted variable: not migrated)</i>						
Motives for migration: studies	.	.	.	.	0.199***	(0.065)
Other motives for migration	.	.	.	.	-0.078	(0.049)
Unemployment rate (postsec)	.	.	.	.	0.566*	(0.307)
Employment rate_skilled	.	.	.	.	-0.272	(0.477)
Regional dummies	Yes all stages					
Cohort age dummies	Yes all stages					

Standard errors in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

## APPENDIX

**Figure 1 The Educational System in Uruguay**

School cycle	Grades	Theoretical ages	Compulsory	School type
Pre-school	0	4-5	No*	Centros CAIF, Guarderías
Educación primaria	1-6	6-11	Yes	Escuelas
Ciclo básico	7-9	12-14	yes	Liceos/UTU
Bachillerato	10-12	15-17	No	Liceos/UTU
Post secondary		18-23	No	University/ Teaching Training Institutes/ Tertiary education (vocational training) /Militar school/ Tertiary education Non University Institutes (private institutions)

\* Since 2008 this level is compulsory for children aged 4-5 years. *Ley General de Educación N° 18.437*

**Table A.1 Main descriptives of the Uruguayan Educational System**

Variables	Total	Male	Female
<b><i>Preschool</i></b>			
Never attended	0.12	0.12	0.12
Public	0.54	0.55	0.54
Private	0.34	0.33	0.34
<b><i>Type of school (all years)</i></b>			
Public	0.78	0.77	0.78
Private	0.17	0.18	0.16
Mixed	0.05	0.04	0.06
<b><i>Lower highschool</i></b>			
<i>Type of institution (attended al grades in)</i>			
Public	0.78	0.77	0.79
Private	0.03	0.04	0.03
Mixed	0.18	0.19	0.18
<i>Track</i>			
General Education	0.86	0.81	0.90
Training institute	0.09	0.12	0.06
Mixed	0.06	0.08	0.04
<b><i>Upper highschool</i></b>			
<i>Type of institution (attended al grades in)</i>			
Public	0.72	0.70	0.74
Private	0.16	0.17	0.15
Mixed	0.12	0.13	0.11
<i>Track</i>			
General Education	0.82	0.76	0.88
Training institute	0.06	0.10	0.03
Mixed	0.11	0.14	0.09
<b><i>Postsecondary</i></b>			
<i>Type of institution (last level attained in)</i>			
Public	79.5	70.78	85.01
Private	20.5	29.22	14.99

ENAJ (2008), ECH (2008)

**Table A.2 Schooling progression (%) by gender and ethnicity**

	<b>Total</b>	<b>Males</b>	<b>Females</b>	<b>Males</b>		<b>Females</b>	
				<b>Non- afro</b>	<b>Afro</b>	<b>Non- afro</b>	<b>Afro</b>
Finished school	96.7	96.6	96.8	96.9	94.8	97.5	95.8
Finished CBU	64.5	63.3	65.8	65.9	47.7	69.5	46.2
Finished high school	29.2	25.4	32.8	28.8	5.1	36.4	13.7
Enrolled Tertiary level	20.5	16.0	24.8	18.2	2.7	27.2	12.0

ENAJ (2008)

**Table A.3 Definition of independent variables**

<b>Variables</b>	<b>Description</b>	<b>Type of variable</b>
Afro-descendant	1 if respondant declares afro descendance; 0 otherwise	Dummy
Age fixed effects	Age in years	Categorical
<i>Mother's highest level attained</i>	Classification according to years of education	Categorical
Low	Less than 9 years	
Medium	Between 9 to 12 years	
High	More than 12 years	
<i>Father's highest level attained</i>	Classification according to years of education	Categorical
Low	Less than 9 years	
Medium	Between 9 to 12 years	
High	More than 12 years	
<b><i>Cognitive ability</i></b>		
Performance in Primary (Repeated)		Categorical
Never	If the individual declares never repeated	
Once	if the individual declares repeated once	
More than once	if the individual declares repeated more than once	
Performance in Secondary (Repeated)		Categorical
Never	If the individual declares never repeated	
Once	if the individual declares repeated once	
More than once	if the individual declares repeated more than once	



**Table A.3 Definition of independent variables (cont.)**

<b>Variables</b>	<b>Description</b>	<b>Type of variable</b>
<i>Noncognitive ability</i>		
<i>Motivation for secondary enrollment</i>	If the individual declares as main reason for enrollment one of the alternatives:	Categorical
Highly motivated	Acquisition of education Today is essential to study You are interested on what you are studying Expect to improve social status through education	
Labor motives	If the individual declares as main reason for enrollment one of the alternatives: In order to quickly find a job Studies while finding a job or start a family	
Not motivated	If the individual declares as main reason for enrollment one of the alternatives: Oblished to	
Other motives	If the individual declares as main reason for enrollment one of the alternatives: Receive subsidies to meet other youths others	
<i>Tried marijuana before 15</i>	Equal to one if the individual declares trying marijuana before age 15; 0 otherwise	Dummy

**Table A.3 Definition of independent variables (cont.)**

<b>Variables</b>	<b>Description</b>	<b>Type of variable</b>
<b><i>Institutional variables</i></b>		
Public school (all years)	Equal to one if the individual declares attending all grades of primary level in a public school; 0 otherwise	Dummy
Attended pre-school	Equal to one if the individual declares having attended pre-school; 0 otherwise	Dummy
Public in lower highschool	Equal to one if the individual declares having attended all grades of upper highschool in a public institution; 0 otherwise	Dummy
Public in upper highschool	Equal to one if the individual declares attending all grades of lower highschool in a public institution; 0 otherwise	Dummy
Vocational education	Equal to one if the individual declares having attended all grades of upper highschool in a General academic institution; 0 otherwise	Dummy
<b><i>Labor market variables</i></b>		
Youth unemployment rate	Unemployment rate of population aged less than 25 by gender, department of residence and different schooling stages*	Numerical
Employment rates	Employment rates calculated at the department of residence level and different schooling stages*	
Unskilled employment rate	Employment rate for workers with less than 9 years of education	Numerical
Semi-skilled employment rate	Employment rate for workers with 9 to 12 years of education	
Skilled employment rate	Employment rate for workers with more than 12 years of education	
<b><i>Migration motives</i></b>		
	If the individual declares as main motives for migration (after completing upper high school)	Categorical
	Study	
	Other (includes labor, health, family, and other motives)	
	Never moved	

\*For example one girl living in Montevideo deciding whether or not to completing upper high school, the unemployment rates used in the model are 3 Female youth unemployment rates in Montevideo, one for each year when the girl was aged 15, 16 and 17; theoretical ages in which girl is supposed to be in upper high school. Similar strategy was used to the calculation of employment rates.

**Table A.4 Independent variables**

Observed personal characteristics	Race
Parental education level (mother and father)	Low (less than 9 yr) Medium (9 to 12 yr) High (More than 12 yr)
Institutional	Public school (all years) Attended pre-school
Cognitive ability	Performance in primary (Repeated) Never Once More than once
	Performance in Secondary (Repeated) Never Once More than once
Non-cognitive ability	Marijuana before age 15* Motivation to enrollment in secondary level Highly motivated Not motivated Labor motives Other motives

\*Tried marijuana before 15 is only included in upper high school in order to avoid endogeneity issues in lower high school.

**Table A.5 Independent variables. Stage-variant regressors**

<i>Lower highschool</i>	<i>Upper highschool</i>	<i>Post-secondary enrollment</i>
Region of residence (departament)	Region of residence (departament)	<i>Motives for migration (at theoretical age of attendance)</i> Never migrated Study motives Other motives (family, labor, health, others)
	<i>Performance in secondary level (Repeated)</i> Never Once More than once	<i>Performance in secondary level (Repeated)</i> Never Once More than once
<i>Labor opportunities</i>		
Unemployment youth rate (by gender, region and for theoretical ages of attendance)	Unemployment youth rate (by gender, region and for theoretical ages of attendance)	Skilled Employment rate (by gender, region and for theoretical ages of attendance)
Unskilled Employment rate (by gender, region and for theoretical ages of attendance)	Semi-skilled Employment rate (by gender, region and for theoretical ages of attendance)	
Institution type (all years in public institution)	Institution type (all years in public institution)	
Unemployment youth rate (by gender, region and for theoretical ages of attendance)	Unemployment youth rate (by gender, region and for theoretical ages of attendance)	
Unskilled Employment rate (by gender, region and for theoretical ages of attendance)	Semi-skilled Employment rate (by gender, region and for theoretical ages of attendance)	
	Vocational education (all yr General educ.)	