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University supply expansion and Inequality of
Opportunity of access. The case of Uruguay

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Expansión de la oferta universitaria e Igualdad de oportunidades en el acceso. El caso de Uruguay

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Resumen

Este documento analiza en qué medida ha mejorado la oportunidad de acceso a la universidad pública en Uruguay durante el período 2008-2013; periodo en el que tuvo lugar una importante expansión territorial de la oferta pública universitaria, históricamente ubicada en Montevideo a otras regiones del país (Interior). Para ello, se elabora un índice de oportunidades de acceso a la universidad, que combina en una sola medida la cobertura de una determinada oportunidad (acceso a la universidad) y la distribución del acceso entre diferentes grupos de población condicionados a sus circunstancias (una medida de la desigualdad de oportunidades).

Los resultados sugieren que las oportunidades de acceso a la Universidad mejoraron durante el período; impulsado por un aumento en la tasa media de cobertura. Sin embargo, la desigualdad en la oportunidad de acceso empeora a lo largo del período, especialmente para el Interior, ya que los estudiantes que ingresan a la universidad provienen relativamente más de entornos familiares más favorables desde el punto de vista socioeconómico que de entornos menos favorables

Palabras clave Desigualdad de oportunidades, Universidad, Descomposición de Shapley

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Abstract

This paper examines whether opportunity of access to public university has improved over the period 2008 to 2013 in Uruguay; in which an important territorial expansion of the public university supply, historically located in Montevideo (the capital of Uruguay), to other regions of the country (named *Interior*) took place. For this purpose, an opportunity index for access to university is elaborated; which combines in a single measure coverage to a certain opportunity (access to university), and the distribution of access between different groups of population conditional on their circumstances (a measure of inequality of opportunity).

Results suggest that opportunities of access to University improved over the period; driven by an increase in the average coverage rate. However, inequality of opportunity of access worsens over the period, especially for the Interior, as new entries to university are relatively more from better-off socioeconomic family backgrounds than those from worse-off family backgrounds.

1. Introducción

Uruguay is a particularly interesting country to analyze the different factors that inhibit people to attain higher levels of education. The country has a large tradition of public and free provided education in all its schooling levels, namely: primary, secondary and tertiary education. In contrast to other Latin American countries, Uruguay distinguishes because of its free access to the university; in which students do not do not need to pay any fee or perform any entrance test.

However, the Uruguayan educational system has two major caveats. First, the large drop-out rate across the educational path, mainly of students from worse-off family backgrounds (Méndez-Errico, 2014). Second, the Uruguayan public university (*Universidad de la República*, UdelaR), the largest one in the country has historically been located in Montevideo, the capital of the country.[1] Youths living in other Departments different to Montevideo, named the *Interior* of the country, and willing to be enrolled in the university, may migrate or daily travel to the capital.[2]

With the aim of providing more opportunities to those students living far from Montevideo and with no financial resources to migrate to the capital, the UdelaR started a territorial decentralization after 2007, by progressively expanding the supply of its careers and courses in the Interior of the country. Then, based on the literature, one would expect that access to university improves; by reducing migration or daily traveling costs to Montevideo, giving students the chance to continue with university without moving of city, and therefore, encouraging young people living in the Interior of the country to further acquire higher education (Bratti et al., 2008; Franta and Guzi, 2012). However, it is not so clear that expansion of university would lead to equality of opportunity of access to university; for instance if youths from less advantaged socioeconomic backgrounds are not accessing to university (Bratti et al., 2008).

This paper aims to study to what extent access to university has improved after its territorial expansion, and if it did in a more inclusive way; that is, by giving more opportunities of access to those students from worse-off family backgrounds. Note that it is beyond the scope of this analysis to address causality of the expansion of university supply on equality of opportunity of access to University. Instead, the objective of this study is to analyze how equally access to university among youths from different family backgrounds and living in different regions of the country is distributed, by comparing two periods of time, 2008 and 2013, before and after the expansion of the university, respectively.

For this purpose, the methodological framework follows Barros et al. (2008) by elaborating an Opportunity Index (named Human Opportunity Index, HOI) for access to university for 2008 and 2013. This index builds on the definition of equality of opportunity provided by Roemer (1998), in which inequalities due to individual's circumstances, that is variables that are not under the individual's control, such as race, gender, age, etc., are ethically unaccepted; while inequalities due to an individual's effort and choices are ethically accepted.

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[1] Own calculations using the National Household Survey (2015) show that 88.1 per cent of those who are or were enrolled in university, are or were in the public one.
[2] A Department is a first-level political and administrative division of Uruguay. *Interior* refers to the regions of the country excluding Montevideo, and includes 18 Departments.

The HOI combines in a single measure coverage to a certain service and the distribution of access between different groups of population conditional on their circumstances, a measure of inequality of opportunity. The HOI measures how unequal access to the service is distributed among people with different circumstances; thus reflecting the proportion of opportunities that need to be reallocated in order to promote universal access to university.[3]

The decomposition of the Opportunity Index within its two elements, coverage and distribution conditional on circumstances, allows to analyze the evolution of the HOI over time through variations in the coverage rate (the scale effect), or due to changes in the distribution of opportunities (equalization effect). Finally, it is possible to characterize those circumstances that mostly contribute to inequality of opportunity of access to university by using Shapley decompositions for each year under analysis; and observe how the contribution of these circumstances varies over time.

Results suggest that opportunities of access to University expanded over the period for the country, Montevideo and the Interior; driven by an improvement in the average coverage rate. Specifically, the gap of access between different circumstance groups increases in the Interior; worsening inequality of opportunity of access to university over the period.

After Shapely decompositions, findings suggest that parental educational background and past performance in primary are the circumstances that contribute the most to inequality of opportunity of access to university. Overall, results support policies that reallocate opportunities among different circumstance groups in order to equalize opportunity of access to University.

The contribution of this paper is twofold. First, it contributes to the literature on education expansion and its effects on inequality by addressing the supply side; an issue relatively less studied in the literature, and usually taken for granted (Oviedo, 2015). Second, it provides empirical evidence on a country case such as Uruguay, in which despite no barriers of entry to university exists and after a great supply expansion took place, inequality of opportunity of access worsens over the period.

The next section reviews the literature on inequality of opportunity in education. Section 3 describes the territorial expansion of the university. Next, data and descriptive statistics are provided. Section 5 describes the methodological framework followed. After reporting the main findings of this study in Section 6, the next section presents robustness checks. Last section concludes.

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[3] In this paper, Human Opportunity Index and Opportunity Index are used interchangeably.

2. Literature review. Inequality of opportunity in education

This paper builds on the inequality of opportunity framework; which distinguishes between inequalities in a certain outcome (e.g. income, education) due to individual's circumstances and effort. The most accepted concept of inequality of opportunity is the one proposed by Roemer (1998) in which inequalities that are brought about by individual' circumstances, like gender, ethnicity and race, beyond the individual's control, are considered ethically unacceptable; while inequality resulting from individual's effort and choices are ethically accepted. This definition requires that any inequality attributed to the influence of exogenous circumstances should be reduced, compensated by public interventions.

Despite the wide use of the inequality of opportunity framework in research studies, several theoretical and empirical discrepancies prevail in the literature. For instance, controversies arise regarding which situations can be considered as fair or unfair, associated to philosophical and ethical discussions and to different conceptions of fairness across societies. This issue may condition the empirical approach for measuring inequality of opportunity[4]; making the distinction between individual's circumstances and efforts not trivial and not an easy task.

Within the literature of inequality of opportunity in education, a first debate relates to the question of whether it is possible to assume young students to be fully responsible for their educational choices or not. On the one hand, some authors argue that since students are not adults, they are not considered to be perfect judges for themselves (De Villé, 2003; Barros et al., 2008); for instance, by not being able to evaluate all the future benefits that may be available by acquiring education, thus making choices according to other non-monetary motivations (Akerlof and Kranton, 2002). If this is the case, the distinction between circumstances and effort is not relevant for education; making circumstances account for virtually all the variability of educational outcomes. In this case, the policy objective should be focused on equalizing achievement (Peragine and Serlenga, 2007).

On the other hand, Waltenberg and Vandenberghe (2007) state that there is a fraction of educational achievements that can be attributed to pupils themselves after a certain minimal age. The authors argue that when pupils are

> *"14–15-year-old youngster, who lives, and is being further prepared to live, in societies where people are, at least partially, held accountable for their acts. For his own benefit, he should be prepared to respond for his acts. Acquiring knowledge and skills depends upon natural and social circumstances (talent, quality of family support, etc.), but it also requires personal commitment and effort, and these variables can be considered to be under control of the individual to a certain extent"* (pp. 712).

A second question relates to considering innate abilities and talents as circumstances. Peragine and Serlenga (2007) highlight the potential conflict that could emerge due to efficiency considerations. The authors state that when talent is considered as a circumstance, then society should compensate less able and talented ones in order to neutralize their effect on the final achievement. However, this can be done in opposition to the role generally attributed to the educational system by the society, that is, to select talents and signal those talented individuals to the labor market. Therefore, efficiency considerations caution those policies intended to

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[4] See Peragine (2011) for a review of the two principles rewarding equality of opportunity and the related empirical approaches.

neutralize the effect of talent, and also posit the debate of the inclusion of talents and abilities within the set of circumstances.

Despite this debate in the literature, a certain consensus exists in considering age, gender, race, region of birth, and parental background (income or wealth, education, occupation) as important individual's circumstances, that influences on individual's future chances of success in life (Barros et al., 2008). In particular, empirical findings stress the persistent effect of parental education background on their children's education achievement; through mechanisms such as cultural influence of parents to their children (by promoting taste for education), parental residential decisions (e.g., by choosing places with better schools, better infrastructure, teachers, and peers), financial resources, and social capital (e.g. greater social networks) that provides a clear advantage to children raised in that environment (Checchi, 2006).

A third issue refers to the outcome of interest in empirical studies, that is equality of what? Studies have mainly focused either on opportunity of access to a certain level of education (e.g., Barros et al., 2009; Vega et al., 2010), or on opportunity in terms of educational performance (e.g., Checchi and Peragine, 2005; Ferreira and Gignoux, 2011; Gamboa and Waltenberg, 2012). Whether to focus on access or performance is not a trivial debate, particularly in less developed countries. For instance, Carvalho et al. (2012) stress that for Latin American students, both access and achievements are important for equality of opportunity in education. But also, the authors point out that the lack of access in a given advantage is even more primary and serious than the relative performance obtained by individuals for which this advantage is accessible.[5] Also that, while both dimensions might pose problems for future generations, the lack of access is arguably more pressing.

While empirical research has largely focused on the demand side of educational expansion (Machin and Blanden, 2004; Machin and Vignoles, 2005; Peragine and Serlenga, 2007; Ferreira and Gignoux, 2011), studies that explore the supply side of higher education and its effects on inequality of opportunity are relatively scarce. Exceptions are found in Bratti et al. (2008) and Oppedisano (2011) for the Italian case, and Oviedo (2015) for the Colombian case. From a theoretical perspective, these studies stress that any reduction in the influence of at least one circumstance on individuals' educational choices can be considered as reducing inequality of opportunity in education. In particular, expanding supply in postsecondary education institutions may be associated to a cost-reduction effect, related to the increased supply and the possibility of enrolling at a university without moving to a different city. Also, expansion of higher education institutions is associated to a potential increase in the expected returns of a higher schooling due to the wider and more diverse available offer (Bratti et al., 2008).

If new entrants are children from less privileged families, the effect of expansion may be the one of inclusion and increasing equality of opportunity almost by definition. But also, this literature recognizes that if barriers of access exist, such as fee payment, credit markets imperfections, or selection tests, the effects of the supply expansion on improving equality of educational opportunity is not so obvious.

In this regard, the literature provides mixed evidence, explained in part by the alternative mechanisms through which expansion in higher education supply takes place across countries. Oviedo (2015) points that supply expansion can be introduced by expanding non-university tertiary education institutions, rising the number of available places in universities, increasing the number of degrees provided, or opening subsidiary centers; that, in some cases, may be

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[5] Carvalho et al. (2012) stress that due to the high drop-out rates observed for children aged 15 years old in Latin America, only focusing on achievement would mislead about the fairness on education.

better reflecting local labor market demands. Finally, in some cases these reforms have been accompanied by fostering the private sector share.

3. University supply expansion and the educational system in Uruguay

This paper studies public university supply in Uruguay between 2008 and 2013, period in which an important expansion of public university took place. Before the large territorial expansion, public university was mainly located in Montevideo. Conversely, in the Interior of the country supply was scarce, with scant carriers offered (Figueroa Garrido, 2014). Instead, students choosing to continue to university could migrate to Montevideo, or daily commute if living in Departments closer to Montevideo. In turn, private universities were also located in Montevideo. Tertiary supply in the Interior of the country was mainly Teaching Training Institutes publicly provided.

With the aim of reducing the geographical gap of access to university, the UdelaR begins its territorial decentralization. This process defines 6 regions: North, North-East, East, South-center, South-west, and the metropolitan area of Montevideo (Figure 1). By 2013, the presence of the UdelaR covers three of the five regions in the Interior: the North-west, East and North-East regions. Regional centers (CENURes: *Centros Regionales Universitarios*) are located in different departments within each region (Figure 1) chosen by considering potential demand and distance to Montevideo, among others

The supply expansion creates complete grade careers, partial grade careers (named CIO: *Ciclo Inicial Optativo*, that allows students to start a career in the Interior but finish it in Montevideo), and short-term university degrees (*Tecnicaturas*). In those regions in which university supply is not yet available (South-west and South-center), internal migration or daily travelling, are the only options for attending to university.

Over the period considered, access to UdelaR largely improves by region of analysis and knowledge area; especially in the Interior of the country in which students enrolled in UdelaR doubles the one observed in 2007 (Table 1). In a similar way, new entries in non-university tertiary institutions and private universities located in the Interior grow over the period (Tables A.1 and A.2 in the Appendix, respectively).

Conversely, high school graduation rate did not dramatically change over the period. In 2008, 33 percent of people aged 18 to 23 completed high school versus 35 percent in 2013. Then, as secondary completion rate is stable over the period, it can be ruled out the possibility that the large increase in public university enrollment is due to great cohort variations. Instead, it is possible to conjecture that a shift is taking place from students choosing non-university tertiary education to the public university; or those deciding not to migrate to Montevideo and to attend to a university closer to their regions of residence.

A priori, descriptive analysis of enrollment rate in non-university tertiary education (Table A.1) and migration patterns (Table A.3 in the Appendix) it is not possible to test whether improvement in enrollment rate at university is due to youths changing their educational or residential choices.

4. Data and descriptive statistics

This paper uses microdata from the National Adolescence and Youth Survey (ENAJ: *Encuesta Nacional de Adolescencia y Juventud*) conducted in 2008 and 2013. The ENAJ is a cross-sectional representative survey for all adolescents and youths aged 12 to 29 living in cities larger than 5,000 inhabitants. In total, the original survey includes 4,993 individuals in 2008, and 3,816 in 2013.

Since the ENAJ surveys the same households interviewed in the Continuous Household Surveys (ECH) in both years under analysis, it allows to merge information from both surveys.

Of interest for this study, the ENAJ brings rich information on individual's socio-demographic characteristics, parental educational background, region of residence and region of birth. Also, the ENAJ contains retrospective information regarding past performance in the education system (repetition in primary), motives for attending secondary level, and risky behaviors of interest (such as substance consumption). The ECH complements the ENAJ by providing information on respondents' race.[6]

Since the aim of the analysis is to compare equality of access to University before and after the territorial expansion of the UdelaR, the sample is restricted to people aged 18 to 23 before and after the decentralization (interviewed in 2008 and 2013). For instance, those with 23 years in 2008 may had theoretically decided whether to enroll in University in 2003, at the theoretical age of 18. In turn, youths aged 23 in 2013 were 18 years old in 2008, theoretical age for high school graduation. The final sample includes 2,820 observations (1,586 in 2008 and 1,234 in 2013).

Tables 2 and 3 report descriptive statistics. First, it is observed an improvement in enrollment at university, from 13.5 percent in 2008 to 21 percent in 2013 (Table 2). By parental educational background, a transition to a distribution in which youths come relatively more from medium parental backgrounds takes place, as a consequence of the increase in the general level of education. Also, note that the proportion of students in university from better-off family background shows the largest growth over the period, while university enrollment rate for students with low and medium educated parents remains relatively stable over the period.

Finally, the comparison of youths' observable characteristics enrolled in university in 2008 and 2013, shows no great variations. (Table 3).

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[6] Afro-descendance is auto-reported in the ECH. For this study, individuals reporting having black or afro descent are considered afro-descendants. Non-afro descendants are all individuals reporting not having afro-descent. In Uruguay, afro-descents are estimated on average on 10 percent of total population.

5. Methodological framework

In order to address the research question of whether equity in access to University has improved after the territorial decentralization of the UdelaR, this paper builds on the elaboration of the Human Opportunity Index proposed by Barros et al. (2008). The first subsection describes the HOI, its elaboration, properties and caveats. The next subsection presents the empirical strategy followed in this study.

5.1. The Human Opportunity Index (HOI)

5.1.1. Description of the HOI

The HOI is a single calculation in which coverage of a certain opportunity is adjusted by how unequally the access to a particular service or good is distributed across various groups. This index combines two elements: average access to a certain good or service ($\bar{p}$) and the extent to which the distribution of these opportunities is conditional on circumstances, exogenous to the individual (D).

Following Barros et al. (2008) the HOI can be expressed as:

$$HOI = \bar{p} * (1 - D) \tag{1}$$

where $\bar{p}$ is the average coverage rate of access and $(1 - D)$ is the equality factor that takes the value 1 if access to a certain opportunity is independent of the circumstances; D defined as:

$$D = \frac{1}{2\bar{p}} \sum_{j=1}^{n} \alpha_j |\bar{p} - p_j| \tag{2}$$

with p_j the specific coverage rate of circumstance group j and α_j is the proportion of people in group j on the total population.

The D-index, named the dissimilarity index or the inequality of opportunity index, measures unequal access rates to a given opportunity for groups defined by circumstance characteristics, compared with the average access rate for the population considered as a whole. Then, it is possible to identify circumstance groups with coverage rates below the average; the opportunity-vulnerable groups. The distance between the number of people in a vulnerable group and the number of people with access to a certain service is the opportunity gap. Then, the HOI can be interpreted as the number of existing opportunities in a given society that have been allocated based on an equal opportunity principle.

Finally, both the D-index and the HOI ranges between 0 and 100 percent. In a situation of perfect equality of opportunity the D-index ranks 0. Thus, this index reflects the share of the total number of opportunities that needs to be reallocated from better-off to worse-off groups in order to ensure equality of opportunities. The interpretation of the HOI is exactly the opposite; it reaches the maximum value (100 percent) when average coverage rate is universal.

5.1.2. Estimation of the HOI

Different procedures can be used to calculate the inequality of opportunity index, such as parametric, nonparametric, or semi-parametric techniques. For binary outcomes, Barros et al. (2008) proposed to first estimate a logit model on whether the individual i has access to a given opportunity as a function of his circumstances; and then to estimate the predicted probability of access to the opportunity of each individual i in the sample ($\hat{p}_i$) by using the coefficients estimated with the logistic regression.

$$\bar{p} = \sum_1^n w_i \, \hat{p}_i \qquad\qquad\qquad (3)$$

$$\hat{D} = \frac{1}{2\bar{p}} \sum_1^n w_i |\, \hat{p}_i - \bar{p}| \qquad\qquad\qquad (4)$$

with $w_i = \frac{1}{n}$ or some other sampling weight.

Then, the HOI is estimated as follows:

$$\widehat{HOI} = \bar{p} * (1 - \hat{D}) \qquad\qquad\qquad (5)$$

5.1.3. Properties and caveats of the HOI

The properties of the HOI are summarized following Barros et al. (2008) and Hoyos and Narayan (2011). First, the HOI is scale invariant, so any variation –additive or multiplicative– of the coverage rates of all circumstance groups will change –additive or multiplicative– in the same proportion the HOI; it ranges between $\bar{p}^2 and \bar{p}$; is Pareto consistent (the HOI improves if one circumstance group coverage rate increases and no loses in access for the remaining circumstance group); and is sensitive to distribution, that is, the HOI improves if the coverage rate of a vulnerable group increases holding the average coverage rate constant.

Important, the D-index (and thus the HOI) can change if more circumstances are added to the analysis; then the estimated one is a lower bound for an initial set of circumstances defined; it can only increase if more circumstances are added to the initial set of circumstances considered.

Due to the decomposability of the HOI, the sources of the evolution of the HOI can be decomposed into changes in the coverage rate $\bar{p}$ (*scale effect*) and in the index of inequality of opportunity D-index (*distributional effect*).

$$\Delta HOI = HOI_f - HOI_i = \Delta\bar{p} + \Delta D \qquad\qquad\qquad (6)$$

where f and i are, respectively, final and initial values of the indexes; and $\Delta\bar{p}$ and ΔD are the scale and distributional effects, respectively.

$$\Delta\bar{p} = \bar{p}^f (1 - D^i) - \bar{p}^i (1 - D^i) \qquad\qquad\qquad (7)$$

and

$$\Delta D = \bar{p}^f (1 - D^f) - \bar{p}^f (1 - D^i) \qquad\qquad\qquad (8)$$

One caveat of the D-index is that it does not varies with redistribution of opportunities among vulnerable (or within non vulnerable) groups. A second limitation is that the index is not sub-group consistent; meaning that the D-index (and the HOI) cannot be decomposed into similar measures for sub-groups of the population, and that variations in HOI for a certain opportunity

over time for the whole population may not be consistent with the change in HOI for sub-groups of the same population (Hoyos and Narayan, 2011).

5.1.4. Identification of the sources of Inequality of Opportunity

Shorrocks (1999) first proposed the Shapley value method to decompose poverty and inequality indices, and was recently applied by the World Bank (2012) to decompose the HOI. The idea behind the Shapley decomposition is to identify how much the measure of inequality of opportunity varies when a circumstance is added to the initial set of circumstances.

The Shapley decomposition meets two desirable rules: is symmetric and yields a exact decomposition (Shorrocks, 2013). Then, the contribution assigned to any given factor should not depend on the way in which the factors are labeled or listed (symmetric). Also, that the contribution of each factor can be interpreted as the marginal impact of each circumstance when all the *s!* possible eliminations sequences are considered (exact and additive).

The impact of adding a circumstance C_A in the dissimilarity index is given by:

$$D_{C_A} = \sum_{S \subseteq N \setminus \{C_A\}} \frac{|s|!(n-|s|-1)!}{n!} [D(S \cup \{C_A\}) - D(S)] \qquad (9)$$

where N is a set of all circumstances, which includes n circumstances in total; S is a subset of N (containing s circumstances) excluding the circumstance C_A. $D(S)$ is the dissimilarity index estimated with the set of circumstances S. $D(S \cup \{C_A\})$ is the dissimilarity index calculated with set of circumstances S and the circumstance C_A.

Then, the contribution of circumstance C_A to the dissimilarity index is defined as:

$$K_{C_A} = \frac{D_{C_A}}{D(N)} \qquad (10)$$

and $\sum_{i \in N} K_i = 1$

Thus, inequality of opportunity can be decomposed into its sources by estimating the relative importance of each circumstance; and the sum of the contributions of all circumstances adds up to 100.

5.2. Empirical strategy

In this study, the opportunity under analysis is access to public university. Then, a dummy variable for university enrollment is considered for youths aged 18 to 23; and takes the value one when the individual is or was enrolled at the university, and zero otherwise. In turn, a basic set of circumstances considers gender, age, race, region of residence at theoretical ages for attending to lower high school, and parental educational background.

Gender is a dummy variable equal to one for girls and zero for boys. Age is a categorical variable ranging 18 to 23 years old, and reflects possible year effects affecting the decision to be enrolled in the UdelaR.

Race equals to one for those individuals declaring afro-descent, and zero otherwise. Race is pointed by the literature as an important transmitted parental trait that influences individual's

education attainment (Bowles and Gintis, 2001 and 2002; Cameron and Heckman, 1998 and 2001). Previous studies show that race is an important factor affecting schooling progression in Uruguay (Porzcecanski, 2008; Méndez-Errico, 2014) and with persistent effects of parental education on their children education achievement (González and Sanromán, 2010).

Parental educational background is defined as the maximum attained educational level between the youth mother' and father'. Low education refers to both parents having less than 9 years of education; medium education is at least one parent having between 9 and 12 years of education; and high education is defined as at least one parent completing more than 12 years of education. It is expected that children from better-off parental educational background are more likely to attain higher education than those from worse-off parental educational background.

Region of residence is the place where the individual lived at the theoretical age that he is supposed to be enrolled in lower high school. The regions are defined as the ones in the UdelaR expansion process: North-east, North-west, East, South-west and South-center (grouped), and Montevideo.[7]

Alternative estimations adds to the basic set of circumstances different variables such as past performance in primary school, retrospective reported motives for secondary enrollment, and risky behavior as a proxy of non-cognitive abilities.

The inclusion of past performance in primary can be controversial as part of the literature states than can reflect individual's effort. This study follows the literature that argues that individuals aged below 18 are not fully responsible for their actions, as they may not be able to evaluate all the future benefits derived from attaining high levels of education. Indeed, performance in primary is likely to be influenced by parental educational background, as more educated parents may be more aware of the economic and psychological value of education, pressing more on the child's achievement at school (Checchi, 2006). Then, it is expected that those individuals repeating once or more than once in primary are less likely to attain tertiary education.

Motivation for secondary enrollment equals one if the individual reports high motivation (if declares high value of education) and zero otherwise (if reports enrollment because he was 'pushed to' and to a less extent, declaring enrollment while they find a job). Then, it is expected that those more motivated individuals are more prone to attain higher education (Cameron and Heckman, 1998, 2001).

In turn, the analysis includes risky behavior in adolescence, proxied as a dummy variable on whether the individual tried marijuana before 15. Risky behavior can be signaling consciousness and agreeableness, pointed by the literature as important personality traits that affect schooling attainment (Heckman et al., 2006 and 2014; Gullone and Moore, 2000).[8] Also, risky behavior can be reflecting the youth's family environment. Then, it is expected that riskier individuals are less likely to attend to university.

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[7] The surveys conducted in 2008 and 2013 differ in the sample design. While in 2013 Departments surveyed are raffled from a geographical regionalization previously stated by considering the proportional probability to the size of young people according to previous estimates of the ECH (with the exception of the metropolitan area); all Departments were surveyed in 2008. Details of the sample selection is provided in
http://ine.gub.uy/c/document_library/get_file?uuid=85d373da-1950-4452-a8de-975e00ff0681&groupId=10181).
[8] Agreeableness reflects the tendency to act in a cooperative, unselfish manner; while consciousness represent the tendency to be organized, responsible and hard working (Almlund et al., 2011).

Finally, an extended model includes all variables defined above, that is the basic set of circumstances plus past performance in primary, risky behavior and motivation.

6. Empirical results

Before presenting the results of the HOI, Panels A and B in Table 4 report the marginal effects after logit regressions for different circumstances affecting the probability of enrollment in public university, for 2008 and 2013, respectively. Then, it is possible to observe those circumstances that are statistically significant in fostering/inhibiting students' enrollment in university.

Results show that the coefficients have the expected sign and are statistically significant for both years under study. Youths with educated parents are more likely to be enrolled in university than those from worse-off parental educational background. In turn, afro-descendents have less chance to attain higher education than non-afro. Findings also stress that those who performed worse in school have less chances to access to university (Column 2). Notice also that the estimated coefficient of parental background decreases its magnitude; reinforcing the idea that less educated parents invest less in their children' schooling performance (Checchi, 2006).

Next, the model adds retrospective motives for high school enrollment to the base model. Results show that motivated students are more likely to be enrolled in the university in comparison to not motivated ones (Column 3). Similar to what was found when past performance in school was considered, parental educational background decreases its magnitude in explaining university enrollment if motivation is included; pointing that more educated parents are more likely to motivate their children to acquire higher education.

In turn, Column 4 shows that adolescent risky behavior, that is whether the individual tried marijuana before aged 15, negatively affects the probability of being enrolled at university. In this case, the estimated parental educational coefficients do not vary when risky behavior is added to the base model.

Results are similar in 2013. Overall, worse-off parental educational background, poor performance in primary, lack of motivation in secondary enrollment, and adolescent risky behavior inhibits university enrollment. In what follows, the analysis will focuses on the extended set of circumstances considered.

6.1. HOI estimation and its evolution over time

Table 5 presents the estimated Opportunity index for access to university, the coverage rate, the dissimilarity index and the penalty for 2008 and 2013, for the extended set of circumstances. The HOI is calculated for the country and separately for Montevideo and Interior.

Results show that the country expanded opportunity of access to university over the period. Specifically, the HOI for the country increases from 7.9 percent in 2008 to 12.1 percent in 2013. However, the low opportunity of access to university despite its improvement, shows the large room for policy interventions in order to increase opportunity of access to university.

By definition, the HOI combines the average coverage rate of access to university and an index of inequality of opportunity (the D-index). In 2008, the average coverage rate is 13.5 percent;

while the D-index has a lower bound of 41.3 percent; meaning that at least 41.3 percent of opportunities need to be reallocated from better-off to worse-off circumstance groups in order to restore equality of opportunity. In 2013, the average coverage rate is 21.1 percent and the D-index 42.5 percent. Then, while average coverage rate increases, the distribution of opportunity of access to university among different circumstance groups favors disproportionately more those individuals from better-off circumstances. The improvement of the HOI in 4.2 percentage points is explained by a positive scale effect and a negative equalization effect (Table 5).

Similar effects are observed when analyzing the HOI for Interior and Montevideo. The HOI increases in both regions (1.6 and 6.2 percentage points, for Interior and Montevideo, respectively); largely due to the improvement in the average enrollment rate, while equality of opportunity worsens in both regions.

Overall, contrary to what one could expect, inequality of access increases in the Interior after the supply expansion. Alternative explanations point to a shift in the educational demand side. For instance, if those students that would have migrated to Montevideo if UdelaR's expansion has not taken place are from non vulnerable circumstance groups, instead decides either to stay in their regions of origin or to move within the Interior; then it is likely that the opportunity gap of access to university among youths increases. A second possibility is a demand shift within the public tertiary education of students from different parental backgrounds. Both alternatives are further discussed below.

6.2. Sources of inequality and its evolution over 2008 -2013

Table 6 displays Shapley decompositions of the sources of inequality for the country, by region and year of analysis. Parental educational background is the circumstance that contributes the most to inequality of opportunity for the country in 2008; explaining 44 percent of the inequality of access to university, while past performance in primary explains 28 percent. The relative contributions of the remaining circumstances are relatively small; gender, age, region of residence, race, motivation, and risky behavior, all together explains almost 30 percent of total inequality.

By comparing the shares of circumstances that contributes relatively more over the period, it is observed that parental educational background increases its contribution from 44 percent in 2008 to almost 60 percent in 2013. All the remaining circumstances decrease their contribution to inequality. Notice, that, if past performance, risky behavior and motivation for secondary enrollment, are in part reflecting youths' family environment; then these circumstances together with parental educational background explains 85 percent of inequality. Results do not change when focusing Montevideo and Interior separately.

6.3. Discussion of results

Findings of this study presented so far can be summarized as follows. Opportunity of access to university increased over the period and among different regions of the country. Coverage rate has improved in 2013, with a larger extent in Montevideo than in the Interior. However, this expansion has disproportionally benefited more well-off youths –those with high educated parents– in comparison to those from more vulnerable backgrounds, increasing inequality of opportunity; specially in the Interior of the country.

One possible explanation refers to a shift in the migration pattern in which students from better-off family backgrounds choose to stay in the Interior instead of moving to Montevideo, then increasing the gap of access among students from different family backgrounds. A second explanation to be explored points to a reallocation of students among the different tertiary educational choices provided by the public sector.

To assess the extent of variations in the migration pattern or the demand shift within the public tertiary education, HOI estimations are repeated for the sample that never migrated and for public tertiary education as a whole. Results are shown in Table 7, Panels A and B, respectively.

Once restricted the sample to the stayers, the estimated HOIs for the country and regions of analysis are lower than for the whole sample (Panel A in Table 7 versus Table 5). Then, migration can be seen as a strategy taken by those students seeking for opportunities of access to university when non supply is available in their regions of residence.

In turn, the estimated D-index for Montevideo in 2008 for the total sample is higher than the estimated one for non-migrants; giving insight that students migrating to Montevideo are relatively more from better-off parental backgrounds. Similar result is observed for the Interior in 2008.

For 2013, similar D-indexes are obtained when restricting or not the sample in both regions of analysis. Specifically, this result can be interpreted as a large proportion of wealthy students deciding to stay within the Interior instead of migrating to Montevideo for university enrollment. Findings are consistent with estimations of the D-index for Montevideo; the distribution of students from different parental educational backgrounds who access to university is not modified if excluding those that migrate.

Descriptive statistics of migration flows reinforces previous results. When focusing on migration patterns across students from different parental educational backgrounds, Table A.6. in the Appendix shows that migration within the Interior and from Montevideo to the Interior, surpasses the variation flow of students from the Interior to Montevideo. Notice, also that, the rise in the proportion of students with high educated parents that moves within the Interior is larger than the observed from Interior to Montevideo (21.6 versus 11.4 percentage points respectively, in Table A.7 in the Appendix).

Next, HOI estimations are re-run by considering access to public tertiary education (public university and teaching training institutes). Results for the country and by region of analysis are reported in Panel B, Table 7. Note first that, while the HOI increases for the country and for Montevideo, the opposite is observed for the Interior. Also, that the improvement of the HOI is driven by a positive scale effect, that more than compensates the negative equalization effect. Conversely, findings for the Interior show a reduction of opportunity of access to public tertiary education, due to an increase in inequality that surpasses the improvement in the average coverage rate.

Second, if comparing the coverage access rate of the university (Table 5) to that of the total public sector (Table 7, Panel B), it is seen that the first one raises more than the second one; giving insight of redistribution of students within public tertiary education after the university expansion. Also, observe that inequality of access to university is higher than for public tertiary education in the Interior (48.6 versus 46.9 percentage points). Overall, it seems plausible that a shift of students from better-off circumstance groups from non-university tertiary education to university is taking place in the Interior.

Summing up, descriptive analysis points out that the hypotheses of variation in migration patterns for access to university and demand shifts within the public tertiary education cannot be ruled out for explaining the increase in inequality of access. In this sense, future research should address students' behavior, expectations and aspirations when choosing a university career and the associated decision of whether to stay or migrate for university enrollment. This decision may depend on the different educational careers available at the regional level, but also, the expected reward in labor market and the social status associated to different educational choices.

As previously stated, different careers are opened within the Interior, ones more demand oriented, related to the productive structure of the region; others more "traditional" ones, such as law degree, and also available in Montevideo; while other educational options allow the student to begin their career in the Interior and to finish it in Montevideo. Then, further research on inequality of opportunity should address the interplay of both supply and demand sides of the university expansion, the diversification of university careers at the regional level on individual's educational and residential choices.

One concern regarding previous findings is that inequality of access to university may be reflecting disparities of opportunity in completing previous educational levels. In particular, in Méndez-Errico (2014) it is shown that students with less educated parents, worse performance in the educational system, less motivated for secondary enrollment, and with early risky behavior, are less likely to survive higher schooling stages. Next section addresses selection into high school completion as a robustness check.

7. Robustness checks

The analysis of public university attendance for all individuals in the sample (that is considering those who completed as well as those that did not attained high school) might confound the effect of family background on making the transition from secondary to university with the cumulative impact of family background across all previous transitions (Cameron and Heckman, 1998). If this is the case, the probability of enrolling in university would be biased, affecting in turn the dissimilarity index, the coverage rate, and therefore, the HOI estimations.

Ideally, estimations would be corrected for sample selection into university, by using two-stage estimation method. However, there is not available additional data for the years in which is assumed that both cohorts were in high school one could use for such purposes.[9] So, instead this paper follows Oviedo (2015) and Bratti et al. (2008) who replicates estimations with a restricted sample to those who have already graduated from secondary education at the time of the survey; which gathers 1,017 observations (almost 36 percent of the total sample).

The estimated extended model for the restricted sample for regions of the country is presented in Table 8. Some differences arise when comparing the estimation of the HOI and its components for the total sample and the conditional one. First, the HOI and the coverage rate are larger (in magnitude) and the D-index is lower when restricting the sample; that is once graduation of secondary is attained. Then, it is likely that the reported HOI in Table 5 is picking up inequalities of completion of previous schooling stages.

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[9] For instance, one possible exclusion variable that reflects educational resources at the department level is the ratio of students per class, data that is provided in MEC yearbooks until 2003. However, this information is not reported at the Department level after 2003.

Second, while results hold regarding the observed improvement in the HOI and the coverage access rates for the country and for both regions defined, discrepancies in the evolution of the D-index arise. As for the whole sample, inequality of opportunity of access to university worsens for the Interior when restricting the sample to high school survivors. However, equality of opportunity improves for the country and Montevideo when excluding students that did not graduate from secondary level.

Note also that the HOI for Montevideo in 2013 is almost 55, showing that more than half of students who succeeded secondary have access to university and this is skewed towards more equally distributed in favor of youths from less favorable circumstances (contrary to what is observed in 2008).

When restricting the sample for those that survived high school and never migrated, previous findings presented in Table 8 are confirmed (Panel A, Table A.4 in the Appendix). In particular, the retention of youths from better-off parental backgrounds in the Interior may explain the raise in dispersion of opportunities of access to university.

Third, no great changes in opportunity of access to public tertiary education are observed if restricting or not the sample for those completing high school (Panel B, Table A.4 in the Appendix).

Finally, once secondary completion is taken into account, parental educational background on inequality of opportunity is the most important circumstance that contributes to inequality of opportunity in 2013. Past performance in primary education, conversely, decreases its relative contribution to inequality; possibly reflecting the key role it plays for secondary attainment (Table A.5, in the Appendix).

8. Conclusion and further research

The main goal of this paper was to examine the evolution of the opportunity of access to public university before and after its territorial expansion. Also, this paper aimed to study the contribution of individual's circumstances to inequality of opportunity of university enrollment, and its evolution over time.

For this purpose, this study followed the methodological framework proposed by Barros et al. (2008), in which an Opportunity Index was estimated for university enrollment. By decomposing the variations of the HOI index in its effects and by examining the sources of inequality of opportunity and its evolution over time, this analysis provides a more accurate picture of university enrollment in Uruguay.

The findings of the study showed an improvement in the Opportunity Index in access to university in Uruguay. The expansion of university enrollment was driven by an increase in the coverage rate for different circumstance groups. However, the most favored ones, those with better-off parental educational background, and to a lesser extent those who performed better in primary education, motivated and with not risky behavior, are the ones that benefitted the most with the expansion. Thus, inequality of opportunity increased over the period.

When restricting the sample to high school survivors, the improvement in opportunity of access to university is driven by positive scale and equalization effects; thus coverage increased by reducing inequality of access. However, the improvement of the HOI observed for the Interior was driven by an increase of the average coverage rate but worse performance of the inequality of opportunity index.

Alternative explanations explored for previous findings point to a reallocation of students across different regions of the country and among different educational choices; wealthy students prefer to stay in some location in the Interior instead of moving to Montevideo, and choose relatively more to enroll in public university than in public non-university tertiary institutions.

Overall, Uruguay expanded opportunity of access to university increasingly towards the more disadvantaged youths. However, as the coverage rate of students from better-off parental educational background increased more in comparison to those from less-privileged family backgrounds, inequality of opportunity worsened in the Interior of the country. Then, there is still room for policy intervention aiming to increase coverage by expanding opportunity of access to university.

Finally, it is worth to highlight that the decentralization process of the university seems to foster youths to live in the Interior, with positive effects on the human capital accumulation in these regions. Also, that the territorial expansion of the university still continues nowadays; then longer periods of time would allow a better understanding of the trend of the opportunity share. In this sense, the presence of the university in the Interior of the country may affect youths' expectations of education attainment; for instance, by revising behaviors and educational choices, parental expectations on their children's educational outcomes and labor market opportunities.

On this regard, an open question that should be addressed by future studies is the extent to which the university' supply expansion that came with a process of diversion of the educational choices, is channeling students from worse-off family backgrounds to educational options less rewarded in the labor market and considered of lower status by the Uruguayan society.

In sum, future research is needed to evaluate such a policy that may have long-term effects on people's behaviors, expectations and educational decisions, as well as to explore the alternative hypotheses regarding migration patterns or shift demands within public tertiary education.

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Tables and Figures

Chart 1. Territorial regionalization of the UdelaR and centers location in 2013
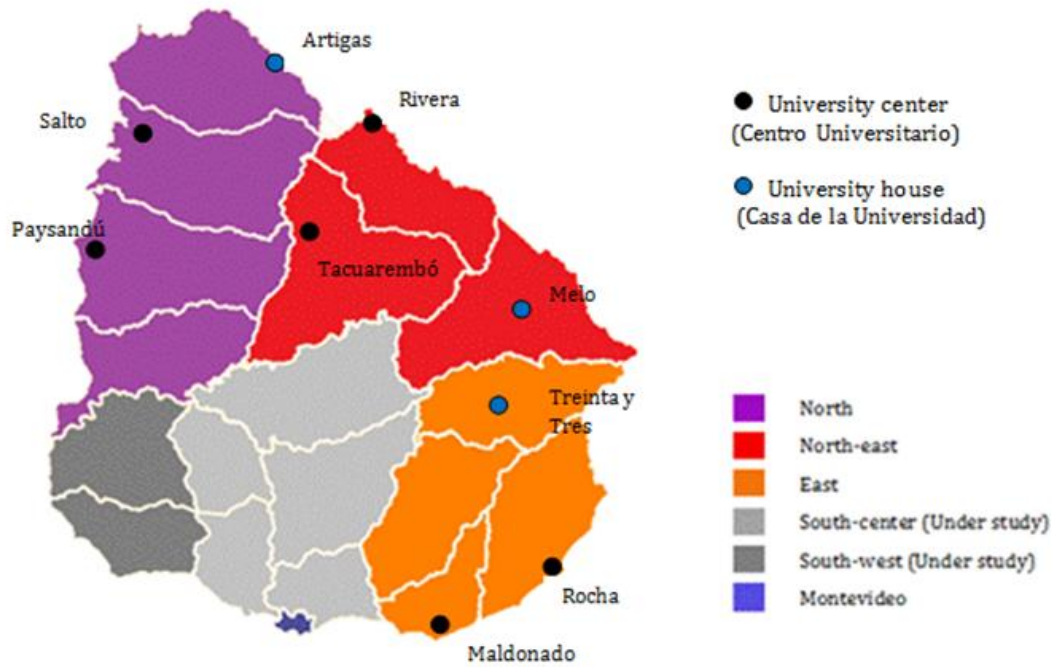
Source: Comisión Coordinadora del Interior
www.cci.edu.uy

Table 1. Public university's new entries, by year, region and knowledge area

		2007	2013			Total 2013
By alternative supply						
Region	Department	Grade	Grade	Technical	CIO	
Technologies and Nature and Habitat Sciences		3,722	4,386	461	0	4,847
East	Rocha		10	19		29
East	Maldonado		52	33		85
North-East	Rivera	92	42	30		72
North-West	Salto	132	263			263
North-West	Paysandú			89		89
Under study	San José			19		19
Montevideo		3,498	4,019	271		4,290
Artistic and Social Sciences		9,043	8,739	1,710	0	10,449
East	Rocha	155	4	72		76
East	Maldonado		48	113		161
North-East	Tacuarembó			97		97
North-West	Salto	327	214	17		231
North-West	Paysandú		41	25		66
Montevideo		8,561	8,432	1,386		9,818
Health Sciences		4,430	5,768	840	0	6,608
East	Maldonado	60	77	41		118
East	Rocha		27			27
North-East	Tacuarembó			30		30
North-East	Rivera	98	2	161		163
North-West	Paysandú	218	205	122		327
North-West	Paysandú y Entre Ríos	65	49			49
North-West	Salto	91	64	27		91
North-west and North-east	Rivera-Salto			1		1
Montevideo		3,898	5,344	458		5,802

Source: Own elaboration based on DGPLAN 2007 and 2013.
Note: CIO: Ciclo Inicial Optativo (Optative initial cycle).

Table 1. Public university's new entries, by year, region and knowledge area (cont.)

By alternative supply Region	Department	2007 Grade	2013 Grade	Technical	CIO	Total 2013
Shared careers (between faculties)		242	751	201	0	952
East	Maldonado		70			70
East	Treinta y Tres			45		45
North-East	Rivera		2	21		23
North-East	Tacuarembó			23		23
North-West	Paysandú		1	12		13
North-West	Salto		23	2		25
Montevideo		242	647	98		745
Simultaneous registrants			**8**			8
North-East	Rivera		2			2
North-West and Montevideo	Montevideo - Salto		6			6
CIO - Sciences and Technology Areas					83	83
East	Maldonado				39	39
East	Rocha				1	1
North-West	Salto				43	43
CIO - Social Area					697	697
East	Maldonado				273	273
East	Rocha				36	36
North-West	Salto				387	387
North-west and East	Maldonado - Salto				1	1
Total Montevideo		*17,407*	*18,442*	*2,213*	*0*	*20,655*
Total Interior		*1,208*	*1,194*	*999*	*780*	*2,973*
East		*215*				*960*
North-East		*190*				*408*
North-West		*863*				*1,584*
Under study						*19*
Total Universidad- country		18,615	19,644	3,212	780	23,628

Source: Own elaboration based on DGPLAN 2007 and 2013.
Note: CIO: *Ciclo Inicial Optativo* (Optative initial cycle).

Table 2. Sample descriptive statistics by year and parental educational level

| | | Parental educational level | | | |
		Low level	Medium	High	Total
2008	Number of observations	491	743	352	1,586
	Per cent in the sample	31.0	46.8	22.2	100
	Per cent in University	2.2	13.3	31.8	13.5
2013	Number of observations	294	640	300	1,234
	Per cent in the sample	23.8	51.9	24.3	100
	Per cent in University	3.04	13.6	61.7	21.1

Table 3. Mean values Students enrolled at UdelaR

Variable	2008	2013
Gender (female)	0.60	0.62
Race (afro descendant)	0.04	0.06
North-west	0.06	0.12
North-East	0.07	0.06
East	0.21	0.05
South-west	0.20	0.22
Montevideo	0.51	0.55
Low educated parents	0.01	0.04
Medium educated parents	0.49	0.34
High educated parents	0.50	0.63
Highly motivated	0.83	0.84
Labor motives	0.01	0.01
Not motivated	0.15	0.13
Other motives	0.01	0.02
Risky behavior	0.03	0.03
Never repeated	0.99	0.97
Repeated once	0.01	0.03
Repeated more than once	0.00	0.00
% of total sample	13.5	21.1
Weighted sample	34,956	60,101

Table 4. Probability of access to university. Marginal effects.

	(1)		(2)		(3)		(4)		(5)	
	Base model		Plus repetition		Plus Motivation		Plus risky behavior		Extended model	
Panel A. 2008										
Female	0.048***	(0.001)	0.045***	(0.001)	0.042***	(0.001)	0.046***	(0.001)	0.040***	(0.001)
age==19	-0.040***	(0.002)	-0.040***	(0.002)	-0.040***	(0.002)	-0.040***	(0.002)	-0.040***	(0.002)
age==20	0.020***	(0.002)	0.025***	(0.002)	0.020***	(0.002)	0.020***	(0.002)	0.024***	(0.002)
age==21	0.009***	(0.002)	0.001	(0.002)	0.010***	(0.002)	0.011***	(0.002)	0.003	(0.002)
age==22	-0.054***	(0.002)	-0.059***	(0.002)	-0.055***	(0.002)	-0.053***	(0.002)	-0.059***	(0.002)
age==23	0.052***	(0.002)	0.063***	(0.003)	0.055***	(0.002)	0.051***	(0.002)	0.061***	(0.003)
Afro-descendant	-0.071***	(0.002)	-0.071***	(0.002)	-0.071***	(0.002)	-0.071***	(0.002)	-0.071***	(0.002)
Omitted Low educated parents										
Medium educated parents	0.109***	(0.001)	0.106***	(0.001)	0.106***	(0.001)	0.109***	(0.001)	0.105***	(0.001)
High educated parents	0.285***	(0.002)	0.245***	(0.002)	0.275***	(0.002)	0.285***	(0.002)	0.243***	(0.002)
Omitted North-west										
North-east	0.001	(0.004)	-0.003	(0.004)	0.007**	(0.004)	0.006*	(0.004)	0.007*	(0.004)
East	-0.027***	(0.003)	-0.042***	(0.003)	-0.029***	(0.003)	-0.028***	(0.003)	-0.044***	(0.003)
South-east	-0.046***	(0.002)	-0.056***	(0.002)	-0.047***	(0.002)	-0.044***	(0.002)	-0.054***	(0.002)
Mvd	-0.031***	(0.002)	-0.034***	(0.002)	-0.031***	(0.002)	-0.029***	(0.002)	-0.032***	(0.002)
Omitted never repeat										
Once			-0.151***	(0.001)					-0.150***	(0.001)
Motivated for secondary enrollment					0.054***	(0.001)			0.037***	(0.002)
Risky behavior							-0.062***	(0.002)	-0.063***	(0.003)

Robust standard errors in parenthesis
* p<0.1, ** p<0.05, ***p<0.01

Table 4. Probability of access to university. Marginal effects (cont.)

	(1)		(2)		(3)		(4)		(5)	
	Base model		Plus repetition		Plus Motivation		Plus risky behavior		Extended model	
Panel B. 2013										
Female	0.046***	(0.001)	0.038***	(0.001)	0.038***	(0.001)	0.042***	(0.001)	0.029***	(0.001)
age==19	0.046***	(0.003)	0.052***	(0.003)	0.047***	(0.003)	0.045***	(0.003)	0.052***	(0.003)
age==20	0.063***	(0.003)	0.070***	(0.003)	0.064***	(0.003)	0.063***	(0.003)	0.068***	(0.003)
age==21	0.026***	(0.002)	0.028***	(0.002)	0.028***	(0.002)	0.026***	(0.002)	0.028***	(0.002)
age==22	0.017***	(0.002)	0.016***	(0.002)	0.016***	(0.002)	0.016***	(0.002)	0.011***	(0.002)
age==23	0.003	(0.002)	0.001	(0.002)	0.007***	(0.002)	0.001	(0.002)	0.001	(0.002)
Afro-descendant	-0.051***	(0.002)	-0.032***	(0.002)	-0.050***	(0.002)	-0.051***	(0.002)	-0.032***	(0.002)
Omitted Low educated parents										
Medium educated parents	0.097***	(0.001)	0.077***	(0.001)	0.091***	(0.001)	0.096***	(0.001)	0.074***	(0.001)
High educated parents	0.561***	(0.002)	0.470***	(0.003)	0.546***	(0.003)	0.557***	(0.002)	0.459***	(0.003)
Omitted North-west										
North-east	-0.064***	(0.003)	-0.056***	(0.003)	-0.063***	(0.003)	-0.063***	(0.003)	-0.055***	(0.003)
East	-0.023***	(0.003)	-0.015***	(0.003)	-0.018***	(0.004)	-0.023***	(0.003)	-0.014***	(0.003)
South-west and center	-0.015***	(0.002)	-0.009***	(0.002)	-0.015***	(0.002)	-0.016***	(0.002)	-0.009***	(0.002)
Mvd	-0.012***	(0.002)	-0.004*	(0.002)	-0.011***	(0.002)	-0.011***	(0.002)	-0.001	(0.002)
Ommited never repeat										
Once			-0.137***	(0.002)					-0.133***	(0.002)
More than once			-0.212***	(0.002)					-0.211***	(0.002)
Motivated for secondary enrollment					0.051***	(0.002)			0.035***	(0.002)
Risky behavior							-0.066***	(0.003)	-0.062***	(0.003)

Robust standard errors in parenthesis
* p<0.1, ** p<0.05, ***p<0.01

Table 5. HOI, Coverage rate and D-index, Scale and distribution effects; by region and year of analysis

	Total country		Interior		Mvd	
Variable	2008	2013	2008	2013	2008	2013
Original						
Coverage (C)	13.5	21.1	10.0	14.4	17.8	28.5
Dissimilarity (D)	41.3	42.5	42.4	48.6	40.1	40.7
Human Opportunity Index (HOI)	7.9	12.1	5.7	7.4	10.7	16.9
Decomposition						
Change (p.p.)		4.2	0.0	1.6	0.0	6.2
Scale (%)		106.0		153.8		102.7
Distribution (%)		-6.0		-53.8		-2.7
Variation						
Coverage %				44.0		59.9
Dissimilarity (D)				14.5		1.5
Human Opportunity Index (HOI)				28.6		58.4

Table 6. Sources of inequality. Shapley decomposition, by region and year of analysis

	2008	2013	2008	2013	2008	2013
	total country		Interior		Montevideo	
Age	7.8	4.7	7.2	6.0	10.1	5.2
Low educated parent	21.8	14.1	25.7	12.8	15.8	12.3
Medium educated parent	3.2	14.0	5.7	11.7	4.4	12.9
High educated parent	18.9	30.7	15.9	26.4	18.8	27.8
Never repeated	14.6	10.1	14.4	10.2	14.2	9.2
Repeated once	10.1	6.7	9.6	6.7	9.8	5.8
Repeated more than once	4.0	3.3	4.0	3.2	3.8	3.3
Female	4.0	3.4	2.3	2.0	5.4	4.6
Afro-descendant	4.6	3.2	5.4	3.0	3.8	3.2
Motivation	6.0	4.9	5.1	3.7	6.1	5.0
Risky behavior	1.7	1.5	0.9	2.2	2.9	1.9
Region Lower HS	3.4	3.4	3.8	12.2	4.9	8.8

Table 7. HOI, Coverage and D-index estimated by year and region. Non migrants and public tertiary education

	Total country		Interior		Montevideo	
Panel A						
Stayers						
Variable	2008	2013	2008	2013	2008	2013
Original						
Coverage (C)	13.8	17.6	11.3	12.5	16.7	24.5
Dissimilarity (D)	38.7	47.0	40.5	48.3	36.1	40.5
Human Opportunity Index (HOI)	8.5	9.3	6.7	6.5	10.7	14.6
Decomposition						
Change (p.p.)	0.0	0.9	0.0	-0.3	0.0	3.9
Scale (%)		265.7		-268.8		127.8
Distribution (%)		-165.7		368.8		-27.8
Panel B						
Tertiary public	**Total country**		**Interior**		**Montevideo**	
Variable	2008	2013	2008	2013	2008	2013
Original						
Coverage (C)	19.6	23.3	17.1	17.8	22.7	29.5
Dissimilarity (D)	36.7	41.4	37.2	46.9	36.7	39.9
Human Opportunity Index (HOI)	12.4	13.7	10.7	9.4	14.4	17.7
Decomposition						
Change (p.p.)	0.0	1.3	0.0	-1.3	0.0	3.4
Scale (%)		187.4		-36.5		128.1
Distribution (%)		-87.4		136.5		-28.1

Table 8. Robustness check
HOI, C and D-index for high school survivors, by region and year of analysis

	Total country		Interior		Montevideo	
Variable	2008	2013	2008	2013	2008	2013
Coverage (C)	40.6	55.7	33.3	47.3	48.2	61.8
Dissimilarity (D)	15.0	13.3	17.7	21.5	13.7	11.5
Penalty (P)	6.1	7.4	5.9	10.2	6.6	7.1
Human Opportunity Index (HOI)	34.5	48.3	27.4	37.2	41.6	54.7
Decomposition						
Change (p.p.)		13.7		9.8		13.1
Scale (%)		92.9		118.2		89.8
Distribution (%)		7.1		-18.2		10.2

Appendix

**Table A.1. Number of new students in non university public tertiary,
by year and at the Department level**

	2007	2011	2012	Variation 2007-2011 (%)	Variation 2007-2012 (%)
Total country	6,245	8,304	N/D	33.0	N/D
Montevideo	3,253	3,760	N/D	15.6	
Interior	2,992	4,544	5,504	51.9	84.0
Artigas	120	178	266	48.3	121.7
Canelones	549	618	785	12.6	43.0
Cerro Largo	161	346	365	114.9	126.7
Colonia	229	269	324	17.5	41.5
Durazno	96	207	263	115.6	174.0
Flores	20	48	68	140.0	240.0
Florida	167	226	235	35.3	40.7
Lavalleja	86	115	134	33.7	55.8
Maldonado	104	267	358	156.7	244.2
Paysandú	139	332	438	138.8	215.1
Río Negro	70	99	152	41.4	117.1
Rivera	198	422	550	113.1	177.8
Rocha	110	132	140	20.0	27.3
Salto	369	369	424	0.0	14.9
San José	79	140	155	77.2	96.2
Soriano	109	137	144	25.7	32.1
Tacuarembó	133	290	230	118.0	72.9
Treinta y Tres	253	349	473	37.9	87.0

Source: own elaboration based on Statistical yearbooks MEC (2007, 2011, 2012)
Notes: *N/D No data available
**Last available data 2012 for new entrants
Data refers to Training Teaching Institutes (IPA and Magisterio) and excludes Military and Police educational institutions.

Table A.2. New entries in private universities, by year and region of location

	2007	2012	2013	Variation (%)
Private tertiary education	2,247	3,839	3,785	70.9
Montevideo	2,196	3,496	3,468	59.2
UCUDAL	932	1,268	1,124	
Universidad ORT Uruguay	951	1,118	1,090	
Universidad de Montevideo	313	334	323	
Universidad de la Empresa		471	698	
Inst Univ Asociación Cristiana de Jóvenes		184	169	
Inst Metodista Univ Crandon		25	0	
Inst Univ Monseñor Mariano Soler		16	21	
Inst Univ Bios		18		
Inst Univ CEDIIAP		43	25	
Inst Univ CLAEH		19	18	
Rest of the country	51	686	317	1245.1
East region (Maldonado)		*206*		
UCUDAL	8	50	56	
Inst Univ CLAEH		74	80	
Fundación Politécnico de Punta del Este		53	41	
Inst Univ Francisco de Asís		29	36	
North-west region (Salto)		*137*		
UCUDAL	43	137	104	
Total country	2,247	3,839	3,785	70.9

Source: own elaboration based on MEC (2007, 2012 and 2013)

Table A.3. Students enrolled in public university by region of origin and region of enrollment in UdelaR, by year

Region	2008	2013
From Montevideo to Interior	20.0	29.2
From Interior to Montevideo	75.3	63.4
Within the Interior	4.7	7.4
Total	100	100.0

Source: own elaboration based on ENAJ (2008 and 2013).

Table A.4. HOI, C and D-index estimations for non-migrants and public tertiary education conditional on high school survivors, by region and year of analysis

	Total country		Interior		Montevideo	
Panel A. Non moved						
Variable	2008	2013	2008	2013	2008	2013
Original						
Coverage (C)	39.8	49.4	34.5	40.1	45.2	55.6
Dissimilarity (D)	16.6	16.2	20.9	24.2	13.4	12.0
Penalty (P)	6.6	8.0	7.2	9.7	6.1	6.7
Human Opportunity Index (HOI)	33.2	41.4	27.3	30.4	39.1	48.9
Decomposition						
Change (p.p.)	0.0	8.2	0.0	3.1	0.0	9.8
Scale (%)		97.8		141.4		92.0
Distribution (%)		2.2		-41.4		8.0
Panel B. Tertiary						
Variable	2008	2013	2008	2013	2008	2013
Original						
Coverage (C)	58.4	61.7	55.4	58.5	61.5	64.0
Dissimilarity (D)	8.9	11.2	11.0	17.3	8.7	10.6
Penalty (P)	5.2	6.9	6.1	10.1	5.3	6.8
Human Opportunity Index (HOI)	53.2	54.8	49.3	48.3	56.1	57.2
Decomposition						
Change (p.p.)	0.0	1.5	0.0	-1.0	0.0	1.1
Scale (%)		195.0		-273.1		212.0
Distribution (%)		-95.0		373.1		-112.0

Table A.5. Sources of inequality. Shapley decomposition, by region and year of analysis for the subsample of high school survivors.

	2008	2013	2008	2013	2008	2013
Conditional	total country		Interior		Montevideo	
Age	34.5	9.5	26.9	9.9	55.0	11.4
Low educated parent	20.4	2.4	24.5	2.7	8.3	1.0
Medium educated parent	2.7	38.4	8.6	27.8	2.6	21.8
High educated parent	15.1	35.0	13.1	24.0	10.4	20.7
Never repeated	3.9	1.7	3.3	1.1	3.2	1.5
Repeated once	3.9	1.2	3.3	0.9	3.2	1.0
Repeated more than once	0.0	0.6	0.0	0.2	0.0	0.6
Female	0.1	4.1	1.6	8.2	1.3	0.2
Afro-descendant	4.2	0.7	3.9	2.7	3.2	2.9
Motivation	0.6	0.6	2.5	5.7	1.3	4.2
Risky behavior	0.1	1.6	3.0	0.0	3.5	3.9
Region Lower HS	14.6	4.1	9.3	16.6	8.0	30.7

Table A.6 Students' parental educational background and residential choices for university enrollment

	2008	2013	Variation
	%	%	(p.p)
Low education			
Mvd-Int	0.0	30.7	30.7
Int-Mvd	18.3	45.0	26.6
Int-Int	0.0	15.9	15.9
No moved Mvd	25.8	0.0	-25.8
No moved Interior*	55.9	8.5	-47.4
Total	100.0	100.0	0.0
Medium education			
Mvd-Int	8.0	12.1	4.1
Int-Mvd	15.9	17.4	1.5
Int-Int	2.2	3.0	0.8
No moved Mvd	35.3	40.9	5.6
No moved Interior*	38.6	26.6	-12.1
Total	100.0	100.0	0.0
High education			
Mvd-Int	8.0	10.2	2.2
Int-Mvd	18.8	21.7	2.9
Int-Int	1.1	3.3	2.2
No moved Mvd	48.6	46.5	-2.1
No moved Interior*	23.5	18.3	-5.2
Total	100.0	100.0	0.0

Note: No moved Interior reflects that students did not change their department of living within the Interior.

Table A.7. Migration pattern by students' educational background

	2008 %	2013 %	Variation (p.p)
From Montevideo to Interior			
Low	0.0	10.2	10.2
Medium	48.4	34.9	-13.5
High	51.6	54.9	3.3
Total	100.0	100.0	0.0
From Interior to Montevideo			
Low	5.2	8.2	3.0
Medium	42.0	27.6	-14.4
High	52.8	64.2	11.4
Total	100.0	100.0	0.0
Within the Interior			
Low	0.0	16.7	16.7
Medium	64.7	27.1	-37.6
High	35.3	56.3	21.0
Total	100.0	100.0	0.0
No migration			
Low	5.5	0.5	-5.0
Medium	46.3	35.6	-10.7
High	48.2	63.9	15.7
Total	100.0	100.0	0.0
No migration and living in the Interior			
Low	8.7	1.6	-7.1
Medium	55.4	43.0	-12.4
High	35.9	55.4	19.5
Total	100.0	100.0	0.0

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