Inequality of opportunity in education: Evidence from Indonesia, 1997-2007

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Abstract

Education is a strong predictor for economic performance. Therefore, educational inequality particularly in opportunity could make significant contribution to earning disparities. Following Ferreira and Gignoux (2014) parametric method, we construct aggregate indices of inequality of educational opportunities for fourteen Indonesian provinces in the years 1997, 2000 and 2007. Our particular and original contribution is to define individual indices of inequality of opportunity which measure the strength of the influence of predetermined *circumstances* on individual educational achievements. We found that-along the period considered- there has been a declining trend in inequality of educational opportunities but not in all the provinces. Our findings also suggest that gender and parental educational background are the most significant factors for school survival and that the effect that *circumstances* exert on individual educational achievements tend to substantially persist over time and to likely influence future earnings perspectives. Moreover, our causal model which utilizes the aggregate inequality indices suggests the positive impact on educational budget. However, there is not enough evidence that educational budget effectively reduces inequality of opportunity in education.

JEL Classification: D39, D63, I29, O53
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1. Introduction

It has been well recognized that a person's educational achievement is not only a key dimension of her human development in its own right but it also represents a fundamental input for the realization of other human development goals, such

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as wealth, health, employment and political participation. More recently, a number of studies has also shown that both within and across countries, inequalities in education are likely to be reflected into disparities in other dimensions. The existence of such correlations has raised policy and academic interest in the inequality of education and, in particular, two questions have emerged: what are the factors which are driving these inequalities? Are they all "unfair"?

The theory of inequality of opportunity can provide an answer to these questions as it finds its main rationale in the idea that inequality itself can have different sources but not all of these can be equally objectionable. As theoretically conceptualized by Roemer (1998), differences on certain socio-economic outcomes may be partly attributed to individual choices, innate ability, talents and *efforts* and partly to factors or *circumstances* which are economically exogenous to the person, such as gender, sex, and socio-economic background.

While inequalities in education that are due to personally responsibility are fair and don't necessarily need to be suppressed, disparities in educational achievements which result from factors beyond individual's control are, without doubt, inequitable, and should be amenable to equal-opportunity policy interventions that, as suggested by Roemer, will equalize advantages for each centiles of the *efforts* distribution, across groups of people which shares the set of *circumstances*.

Empirical evidence regarding this issue is still less explored. However, OECD (2012) suggests the positive relationship between educational opportunities and labour income. Therefore, educational policies with strong attention on equity could be used a strategic tool to improve economic performance in a long term.

Equality of opportunity could only be achieved when predetermined *circumstances* have no correlation with success in life (de Barros et al, 2008). In the case of education, predetermined *circumstances* should not affect the chance for children to go to school or to achieve identical educational performance.

Among developing countries, evidence using PISA score 2006 placed Indonesia in the lower half of cross-country distribution of inequality of educational opportunity (Ferreira and Gignoux, 2014). Nevertheless, the increase trend of Indonesian GINI index from 31.3 in 1996 to 33 in 2004 and 38.1 in 2011 (World Bank, 2014) signs that educational policies might have not strategically

targeted equity. Therefore, we focus on country level evidence to contribute to the literature about educational inequality of opportunity, particularly for Indonesia.

Using household data from the Indonesian Family Life Survey (IFLS), in this paper we seek to quantify the role of pre-determined *circumstances* in generating inequality in educational opportunities among the Indonesian population over the period 1997-2007.

Our first research question is therefore to find how much of the total level of inequality in education achievement across several Indonesian provinces is explained by the predetermined *circumstances* which are simply inherited by the individuals from their family and location of origin. We then analyze a specific policy determinant of educational equality by evaluating the association between the aggregate index of inequality of educational opportunities and educational budgeting policy at provincial level.

Last, we originally contribute to previous literature, by devising an "individual" index of inequality of educational opportunities which explains-at the individual level- the influence carried by predetermined *circumstances* on individual educational achievements. This allows us to see how much persistent can these *circumstances* be over the individual life's course.

The remainder of this paper is organized as follows. Section 2 is devoted to providing a review of the literature in this field and Section 3 presents the data and discusses methodological issues involved in measuring inequality of educational opportunity and the specific choices we have made. In Section 4 we report and discuss our empirical findings and in Section 5 concluding remarks are given.

2. Inequality of opportunity: conceptual underpinnings and empirical applications.

The concept of inequality of opportunity in education finds its roots in the mid-60s when the Coleman Report (Coleman et al., 1966) started the debate on what is meant by equality of opportunity and on how to achieve it. This report questioned the effectiveness (in terms of a fairer distribution of outputs or educational achievements) of policies aimed at equalizing benefits between students or granting full access to education and argued that socioeconomic

conditions and family background are important factors that drive most of the variation in students' achievements.

The debate on the meaning of equality of opportunity in various income and wealth related outcomes has been then enriched by the contributions of important philosophers and economists (such as Rawls, 1971; Nozick, 1974; Sen, 1980, 1985 and Dworkin, 1981a, 1981b) who posited the importance of compensating individual's different situations especially in cases outside individual's personal responsibility. However, it was only at the end of the Nineties that this concept was explicitly addressed, described and translated into a mathematical formulation in John Roemer's seminal book on equality of opportunity (1998). The main argument of Roemer was based on the distinction between unchosen and predetermined *circumstances* and individual *efforts*. While these latter are attributable to the personal responsibility of the individual, the former are inherited by the individual and are beyond of his or her control. Hence, differences in individual outcomes which are attributable to *circumstances* are not only morally objectionable but can also lead to an inefficient allocation of resources (Ferreira and Gignoux; 2014; Fernández and Galí, 1999) and should be therefore compensated by public policies. On the other hand, outcome differences that are due to individual choices and personal responsibility can be ethically accepted because they represent the natural reward of individual *effort* (see Fleurbaey, 2008).

Measuring inequality of opportunity therefore requires two fundamental preliminary steps: first, the search of a set of factors which can well represent those *circumstances* and second, the partition of a society into groups (or *types*) of individuals sharing the same set of *circumstances* and into groups (or *tranches*) of individuals characterized by the same degree of *effort* (Checchi and Peragine, 2010).

Next, two methodological approaches have been suggested in order to quantify the extent to which a given society is unequal. Either one can adopt an utilitarian "ex-ante" perspective (Van der Gaer, 1993) by considering outcome differences between *types* , prior to the realization of their *effort* level or one can follow an "ex-post" approach by looking at the opportunity set granted to individuals who exert the same degree of *effort* (Roemer, 1998; Checchi and Peragine, 2010). While in the first approach equality of opportunity is achieved when

opportunities are equalized *between types (*Ferreira and Gignoux, 2011, 2014), in the ex-post approach outcomes should be equalized *within tranches* or groups of people who, independently of their inherited *circumstances*, are featured by the same degree of *effort* (Checchi and Peragine, 2010). As noted in Fleurbaey (2008) and Checchi and Peragine (2010) these two approaches do not necessarily generate same rankings of distributions, as compensation mechanisms within *types* will affect opportunity inequality only when adopting the ex-post approach (Checchi and Peragine, 2010). On the other hand, the ex-ante approach can generate a distribution that fully satisfies the utilitarian or reward principle according to which inequality of a given outcome within groups of individuals sharing the same *circumstances* can be fair, as long as these individuals are rewarded according to the amount of *effort* put in order to achieve a certain outcome (Li Donni et al., 2014).

The vast majority of the applied studies on the measurement of inequality of opportunity has focused on the opportunities for the acquisition of income (see, among others, Peragine, 2002, 2004a, 2004b; Bourguignon et al., 2007; Peragine and Serlenga, 2008; Lefranc et al., 2008, 2009; Aaberge et al., 2011; Björklund et al., 2011; Brunori et al., 2013; Andreoli et al.., 2014) whereas relatively fewer empirical studies appear in the domain of education. In this field, three main strands of research have emerged so far: a first strand of the empirical literature has applied the "education production function" framework to directly estimate the effect of specific socio-economic variables on educational outcomes (Fertig, 2003; Hanushek, 1979; Wößmann, 2003; Filmer and Pritchett, 1998) and to directly or indirectly consider intergenerational mobility in educational achievements outcomes (Behrman et al., 2001; Dahan and Gaviria, 2001; Lam and Schoeni, 1993).

A second, more recent strand of the literature has addressed more explicitly the Roemer's theory and attempted to operationalize that concept of inequality of opportunity theory in the domain of education. Some notable contributions include the study by Ferreira and Gignoux (2014) who propose and compute an ex-ante, parametric measure of inequality of educational opportunity for PISA scores in 57 countries; the article by Asadullah and Yalonetzky (2013) who construct several indices of inequality of educational opportunity across Indian states and the analysis conducted by Gamboa and Waltenberg (2012) that

following an ex-ante non-parametric approach, considers inequality of educational opportunity in PISA scores for Latin American students.

Lastly, a third strand of the literature (Mongan et al., 2011; Waltenberg and Vandenberghe, 2007; Iatarola and Stiefel, 2003) have instead focused more on policy-oriented research objectives and have evaluated the opportunity-equalizing effects of education policies.

3. Data and Methodology

3.1 The Indonesian Family Life Survey

Our main data comes from the 1997, 2000 and 2007 waves of the Indonesia Family Life Survey (IFLS) which is a longitudinal individual and household survey data conducted in 13 Indonesian provinces spread out in the islands of Sumatra, Java, Kalimantan, Sulawesi, Bali and West Nusa Tenggarra.

There are interesting features in the IFLS which make this data particularly suited to our research needs. First, the data is featured by high recontact rates (Frankenberg and Thomas 2000) that contribute significantly to data quality by lowering the bias due to non random attrition. Second, in addition to basic demographic and socio-economic characteristics of all the household's members, the IFLS collected detailed information on various educational aspects (e.g., current schooling grade; age at which the child first enrolled at school; number of correct answers given in a cognitive test) as well as on earnings which are necessary to analyze inequality of opportunity in educational outcomes and intergenerational mobility.

3.3 Regional Government Budget data (APBD)

To scrutinize the educational budget policy, we extracted annual provincial revenue data ("Anggaran Pendapatan dan Belanja Daerah"-APBD) from The Indonesian Ministry of Finance. The data are available for public, but the formats are different. Data for 1997 and 2000 combine the budget of education, youth, sport and faith under the same umbrella, while data in 2007 has specific section for educational budget. Even though the correlation established for 2007 and other waves are not head-to-head comparable, they still could give some benefits regarding the general description of the relationship between educational policies and educational inequality of opportunity.

3.2 Methodological framework

(a) An aggregate index of inequality of opportunity

To measure the educational inequality of opportunity, we seek to privilege Roemer's utilitarian principle according to which inequality between individuals featured by different degrees of *effort* is fair (Li Donni et al., 2014) and therefore pursue the ex-ante approach that considers inequality of opportunity as a between-type inequality[1]. As the main educational outcome variable we focus on completed years of schooling which are defined by the last grade the individual achieved in order to avoid measurement error (i.e. the same real year of schooling could reflect different educational levels).

Following Bourguignon et al. (2007) and Ferreira and Gignoux (2014), we apply a parametric methodology to the construction of our aggregate indices of the inequality of opportunity in education (measured by the completed year of schooling):

$$\hat{\theta}_{IOp} = \frac{Var\,(C_i, \widehat{\beta})}{Var\,(y_i)} \qquad (1)$$

which is simply the R-squared of an Ordinary Least Squares (OLS) regression of the individual's educational achievement (y) on a vector C of individual *circumstances*.

As also argued in Dardanoni et al. (2005), the exact content of these *circumstances* is a contentious issue which is largely related to the outcome on which the research is focused. For example, one can reasonably assume to have one set of *circumstances* defining *types* when examining inequality of opportunity for educational attainments (where parental wealth and education may play a central role) and another set when the outcome variable is represented by earnings or other labor market achievements (where gender becomes a key variable).

Among the predetermined *circumstances* available, we therefore stick only with variables that were also proposed by precedent literature on this field, that are truly "pre-determined" and exogenous and that have small rate of missing values to keep the attrition rate low. Those are parental education represented by

[1] The ex-ante approach is indeed well represented in the related empirical literature and it has been adopted by Bourguignon et al. (2007); Checchi and Peragine (2010); Ferreira and Gignoux (2011, 2014), Li Donni et al. (2014)

mother and father completed year of schooling, sex, rural or urban residence and dummies of household wealth such as ownership of the house, other buildings, farm land, livestock, vehicles, household appliances, savings, receivables, jewelry, furniture, electricity, television and other assets. Contrary to Ferreira and Gignoux (2014), we don't include access to books as this variable might actually be endogenous, i.e. parents observing *efforts* and school achievements of their kids might by motivated to buy more books and learning tools to satisfy the increasing needs of their keenest children.

It is important to note that since all the variables included in this analysis are not all the possible predetermined *circumstances*, the R-squared should be interpreted as the lower bound of educational inequality of opportunity[2].

Further, we don't include age as one the explanatory variables of educational attainments. Instead, we run separate regressions for two different cohorts. We argue indeed that whether age is truly exogenous and predetermined, it makes very small sense to consider it as a *circumstance* that may drive inequality of opportunity and, in the case of completed years of schooling, the inclusion of age as one of the regressors will considerably inflate the R-squared. Therefore, by running separate regressions for different cohorts, we make sure that the effect of age is somehow controlled for, but we avoid the risk of obtaining a blurred measure of inequality of opportunity.

Since primary education in Indonesia normally starts at the age of 6, we define our youngest cohort as 6-10 years old and the next cohort is 11-15 years old[3]. We are forced to exclude from our main analysis a third, oldest cohort of 16-20 years because of endogeneity issues that may arise from the fact that older teenagers are more likely to influence household's decision making (i.e. the decision to buy vehicles or to sell livestock or land in order to pay for university fees). In this sense, the ownership of these assets is not truly predetermined but it's partly driven by *effort*, which may blur the interpretation of the inequality of opportunity index.

Once having obtained our aggregate indices of inequality of opportunity for all the Indonesian provinces sampled in IFLS and for three different time periods (i.e. 1997, 2000 and 2007), we are able to analyze time trends and differences among provinces in inequality of opportunity of education.

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[2] A formal proof is provided in Ferreira and Gignoux (2011)

[33] Basic descriptive statistics are reported in Table A1 in the Appendix.

Lastly, by applying the Shapley value method (Shorrocks, 1999; 2013), we can decompose our index of educational inequality of opportunity and find the contribution of each of the *circumstances*[4].

(b) Overcoming the drawbacks of the R-squared

As discussed above, the parametric ex-ante approach proposed by Ferreira and Gignoux (2011, 2014) has derived an index of inequality of opportunity from the R-squared obtained from the least squares regression of the educational achievement on a set of *circumstances*.

However, we argue that the use of the simple R-squared could entail two important drawbacks. First, it will grow no matter what if we keep adding explanatory variables, even though they do not explain anything significant toward the response variable. This problem is easily tackled by substituting the R-squared with the adjusted R-squared that accounts for the significance of each explanatory variable in the model. Nevertheless, it comes with a slightly different range and interpretation from the usual R-squared, as adjusted R-squared can reach negative values that indicates the improper explanatory variables included in the regression outnumbered the proper ones. Moreover, one needs to keep in mind that the decision to exploit adjusted R-squared will shape other measure that uses it, such as Shapley-Shorrock decomposition. Hence, the selection of feasible pre-determined *circumstances* is a crucial step.

Second, since pre-determined *circumstances* potentially have correlation among them, this creates a problem of multicollinearity and the model will have high R-squared while it might be that some of the regression coefficients are not significant. This conflict reflects the inability of R-squared to proportionally act as the aggregate measure of explanatory variables.

Because the presence of multicollinearity by itself affects the significance tests, it designates the estimates uncertainty, i.e. which of the explanatory variables is rightfully responsible for the change in the response variable. Regardless the R-squared chosen, multicollinearity is an issue that requires special care as it is directly related to how we approve the pre-determined *circumstances* in our model. One of

[4] In the Shapley decomposition, the contribution of each factor is determined as average marginal contribution taken over all possible ways in which factors may be removed in sequence.

the formal tests of multicollinearity which we apply in this analysis is the variance inflation factor (VIF):

$$\text{VIF}= \frac{1}{tolerance} \quad (2)$$

where:

$$tolerance = 1 - R_j^2 \quad (3)$$

and R_j^2 is the coefficient determination of each regressor *j* on all other explanatory variables and VIF should be less than 5 or 10 to indicate that the variance of individual regression coefficient does not increase because multicollinearity, which in turn reduces its significance.

As it can be observed in Table 1, our results exhibit close distance between both the R-squared and our preferred adjusted R-squared. This small distance implies that we selected the relatively deserving pre-determined *circumstances* variables because they contribute significantly in explaining the response jointly even after adjusting for the number of variables. Furthermore, each of them has VIF less than 5, so we are confident that multicollinearity is not an issue for this research.

Table 1 The assessment of pre-determined *circumstances*

Analysis:	Cohort	R-squared	Adjusted R-squared
Cross-section	6-10	0.049	0.034
	11-15	0.155	0.145
	16-20	0.233	0.205
Panel	6-10	0.976	0.976
	11-15	0.947	0.947
	16-20	0.947	0.946

Note: The total number of explanatory variables is 33 for cross-section analysis (based on IFLS, 1997) and 15 for panel analysis. These include: parental years of schooling, household wealth/assets dummies, gender, residence and provincial dummies (only for the cross-section). Within R-squared is used for panel analysis. Results for VIF is available on request.

(c) Defining inequality of opportunity at individual level

Although some technical problems with R-squared seem to be relatively easy solved, there is one important question left. To what extent do we, as the researchers, use this measure? Ferreira and Gignoux (2014) have shown that the

R-squared of pre-determined *circumstances* explaining PISA score in each country is significantly associated with two educational policy variables. While the approach is definitely promising, it has the drawback that this aggregate measure cannot work to explain the effect of inequality of opportunity at individual level. Instead, it might be of crucial importance to explain if and how the "burden" of unequal opportunities in education carried by each person will affect her future life achievements such as the completed years of schooling, wage, occupation, income, productivity or non-cognitive ability to name a few. Therefore, we need to find an alternative measure that is able to capture the inequality of opportunity in that sense.

Our attention comes to the fitted values of regression model that are comparable to the R-squared to explain the inequality of opportunity at individual level. In a very simple linear regression setting with only one explanatory variable such as:

$$Y_i = \alpha + \beta x_i + \varepsilon_i, \qquad (4)$$

the fitted values of each individual *i, i*=1,..., n, are simply given by:

$$\widehat{y_i} = a + bx_i. \qquad (5)$$

The R-squared of this model informs how much the variation of variable x explains the variation of variable y for all individuals *i*. The fitted value $\widehat{y_i}$ explains, instead, the predicted value at response variable y of individual *i* that is specifically influenced by explanatory variable x of individual *i*, with b governing the average magnitude of the relationship. Because it comes from the same process to gain the R-squared, we argue that it posses the similar attitudes as the R-squared to qualify as the representation the level of inequality of opportunity discussed by Ferreira and Gignoux (2014) in their paper.

The interpretation of this measure is also quite straightforward. Fitted values are the accumulation of power carried by pre-determined *circumstances* on the total educational attainment. The more pre-determined *circumstances* get involved in the model, i.e. the individual has higher value of x, the higher fitted values $\widehat{y_i}$ is gained, which means the stronger pre-determined *circumstances*, as the

representation of inequality of opportunity, contributes to her educational attainment. This one to one relationship is more understandable when the fitted values is tailored to the standardized range [0,1]. Standardized fitted values zero represent the individuals with the lowest inequality of opportunity given the set of pre-determined *circumstances*, while the values one map the ones with the highest inequality of opportunity contributed by the set of pre-determined *circumstances*. The standardization is particularly useful when this measure is used in other linear models as an explanatory variable; hence the interpretation of one unit difference exactly matches this definition.

Unlike R-squared, fitted values cannot be adjusted. Instead, it purely relies on the coefficients of pre-determined *circumstances* for the significance assessment of explanatory variables. If b_j is large, fitted values will be large too. If b_j is close to zero or practically insignificant, it translates into the fitted values as a very small number. Nevertheless, this measure will potentially suffer from imprecision if b_j is large but the variance is also large that makes it statistically insignificant. Therefore, we need to keep an eye on the statistical assessment of individual coefficients such as t-test and VIF before making decision to move forward using fitted values, or even to refine the model until the empirical assessments are more convincing.

Another issue with fitted values is related to the modeling strategy. Ordinary least square that implicitly assumes normal distribution naturally produces unrestricted fitted values. However, in many cases educational outcomes are bounded and particularly for our case it should have the lowest value zero. Negative fitted values, when this is the case, will violate the nature of completed year of schooling. Therefore, generally speaking it is very important to investigate if the fitted values go beyond their innate boundaries and when it is there, one may have to look at various strategies to overcome this issue prior further analysis.

4. Results

4.1. Levels and trends of inequality of opportunity in education in Indonesia

Table 2 shows our estimates of the inequality of educational opportunity measured as the adjusted R-squared of a set of several regressions run separately for each province, year and cohort.

On average these figures suggests that pre-determined *circumstances* account for a relatively low portion of the total variance of completed years of schooling, but there are remarkable differences among provinces, between cohorts and over time.

We see indeed that inequality of opportunity measure seems to be relatively higher for the oldest cohorts, a finding, this one, which goes against our initial expectations given that one would reasonably assume that while young kids are very much dependent on their family choices, as a person gets older, his achievements and choices tend to be less "dependent" on her parents' choices.

It can also be observed, however, that inequality of opportunity has decreased in almost all the Indonesian provinces analyzed in this paper. Some notable exceptions are South Sumatra, where the portion of overall inequality in educational attainments accounted by inherited *circumstances* grew for the older cohort from 9% in 1997 to 23% in 2007 or in Jakarta, where it grew from 7% to 14%.

In Table 3 we report the decomposition of inequality of opportunity into partial shares by individual *circumstances*. These estimates, which are based on the cross section dataset from 1997, suggest that mother's and father's education are associated with the largest share of inequality in educational achievements. At the national level, they account for 36 percentage points of the overall shares of explained inequality in the cohort of children aged 6 to 10 years and for 60.4 percentage points for the 11 to 15 years' cohort. In some provinces, however, the relative contribution of inherited wealth status measured by ownership of the house and of several assets is particularly prominent. This is for the example the case of East Java, where ownership of the house alone accounts for almost 24 percentage points of the overall share of explained inequality of opportunity in the youngest cohort. Another interesting example is Lampung, where ownership of farm land accounts for about 43 percentage points of overall inequality in the cohort 6-11 years.

Table 2: Aggregate index of inequality of educational opportunities

Province	1997				2000				2007			
	Cohort 6-10		Cohort 11-15		Cohort 6-10		Cohort 11-15		Cohort 6-10		Cohort 11-15	
	Obs	R^2	Obs	R^2	Obs	R^2	Obs	R^2	Obs	R^2	Obs	R^2
North Sumatra	180	0.041	202	0.105	230	0.012	208	0.066	120	0.030	181	0.044
West Sumatra	93	-0.015	142	0.269	113	0.108	142	0.106	68	0.091	77	0.057
South Sumatra	129	-0.018	125	0.099	128	0.079	156	0.201	55	0.162	63	0.231
Lampung	88	-0.002	107	0.257	105	-0.054	124	0.049	61	-0.024	93	-0.025
Jakarta	154	0.001	215	0.069	152	0.052	181	0.070	83	0.017	101	0.141
West Java	273	0.051	301	0.166	427	0.020	327	0.095	185	0.053	246	0.065
Central Java	195	0.062	258	0.152	88	0.012	253	0.095	146	0.031	197	-0.007
Yogyakarta	63	-0.080	93	0.039	304	0.003	97	0.002	53	-0.016	71	-0.038
East Java	197	0.006	287	0.159	118	-0.012	263	0.189	143	0.005	213	0.032
Bali	106	0.058	118	0.126	180	-0.060	116	-0.029	74	-0.011	97	0.037
West Nusa Tenggara	159	-0.024	153	0.122	109	0.062	185	0.044	82	0.079	142	0.009
South Kalimantan	68	-0.085	83	-0.029	147	-0.023	77	0.187	68	0.034	76	0.146
South Sulawesi	110	-0.044	111	0.158	120	0.015	108	0.016	75	-0.040	108	-0.031

Table 3: Decomposing inequality of educational opportunity into individual circumstances shares

	Total	Gender	Mother's Education	Father's Education	Residence	TV	House	Farm Land	Household Appliances	Electricity
PANEL A: Age cohort 6-10										
National	0.035	0.000	0.007	0.006	0.003	0.012	0	-0.001	0.003	0.001
North Sumatra	0.028	0.003	0.003	-0.001	0.003	0.027	-0.005	-0.003	0.004	-0.003
West Sumatra	0.011	-0.006	0.000	0.000	0.003	0.003	-0.001	-0.010	-0.005	0.012
South Sumatra	-0.018	0.011	-0.002	-0.001	-0.005	-0.006	-0.008	-0.001	-0.006	0.003
Lampung	0.0384	-0.007	0.036	-0.007	-0.006	-0.011	-0.006	-0.010	-0.008	0.057
Jakarta	-0.005	0.008	-0.003	0.000	-	-0.003	-0.002	-0.006	0.007	-0.002
West Java	0.044	-0.004	0.008	0.010	-0.002	0.021	-0.004	-0.003	-0.001	0.015
Central Java	0.071	0.010	0.027	0.030	0.003	0.012	-0.004	-0.003	0.004	0.001
Yogyakarta	-0.049	-0.018	0.025	-0.007	-0.004	-0.016	-0.012	-0.017	-0.012	-0.010
East Java	0.029	0.002	-0.003	-0.002	-0.003	0.010	0.007	0.000	0.008	0.015
Bali	0.077	-0.001	0.0142	0.000	0.014	0.027	-0.008	-0.007	0.001	0.051
W. Nusa Tenggara	-0.032	-0.001	-0.005	-0.006	-0.001	-0.006	0.006	-0.004	-0.005	-0.006
South Kalimantan	-0..82	0.001	0.001	-0.014	-0.005	-0.015	-0.010	0.001	-0.016	-0.012
South Sulawesi	0.003	-0.010	-0.006	0.000	-0.001	0.016	-0.010	-0.008	0.030	0.010
PANEL B: Age cohort 11-15										
National	0.140	0.003	0.038	0.046	0.011	0.020	0.000	0.000	0.011	0.140
North Sumatra	0.101	0.016	0.025	0.035	-0.001	-0.002	-0.001	0.011	0.011	0.000
West Sumatra	0.224	0.017	0.045	0.005	0.018	0.042	-0.004	-0.002	0.074	0.015
South Sumatra	0.053	0.005	0.003	0.039	0.002	-0.002	0.016	-0.001	0.001	0.004
Lampung	0.151	-0.007	0.035	0.010	0.058	0.001	-0.008	0.064	-0.005	0.008
Jakarta	0.088	0.009	0.017	0.042	-	0.001	0.023	-0.004	-0.001	0.002
West Java	0.155	0.002	0.041	0.055	0.028	0.013	-0.003	0.008	0.022	-0.001
Central Java	0.157	0.001	0.030	0.043	0.038	0.035	-0.002	-0.002	0.023	0.002
Yogyakarta	0.0677	-0.009	00..6	0.054	-0.010	0.009	0.020	-0.008	0.001	-0.006
East Java	0.156	0.008	0.040	0.027	0.002	0.031	-0.002	-0.002	0.000	0.045
Bali	0.174	-0.003	0.053	0.040	-0.005	0.074	-0.005	-0.004	0.007	0.007
W. Nusa Tenggara	0.118	0.012	0.025	0.035	0.004	0.017	-0.005	-0.003	0.010	0.029
South Kalimantan	-0.021	-0.013	0.008	0.039	-0.007	-0.002	-0.007	-0.013	-0.010	-0.009
South Sulawesi	0.170	0.042	0.049	0.070	0.005	0.008	-0.004	-0.008	0.013	-0.003

Note: Based on cross-sectional data from IFLS 1997.

4.2. Educational inequality of opportunity and public policy

Our next research question is whether there is any significant relationship between the aggregate indices of inequality of educational opportunity and the budget share devoted to education by each of the Indonesian provinces under scrutiny.

In order to do so, we exploit the panel dimension of our data and estimate two separate fixed-effects models: one using inequality of opportunity indices obtained for the cohort 6-10 and the other based on cohort 11-15.

Results, which are reported in Table 4 show that there is a significant association between inequality indices and educational budget share, but only when considering indices of inequality of educational opportunities obtained from the older cohort.

Table 4: Inequality of opportunity in education and public policy

Dependent variable: educational budget share	(1)	(2)
Lag educational budget share	-0.388**	-0.300***
	(0.130)	(0.089)
Lag inequality of opportunity	-4.105	0.019***
	(9.069)	(0.002)
2000	-7.235*	-5.307*
	(3.620)	(2.523)
2007	15.520***	17.050***
	(2.624)	(2.057)
Inequality of opportunity measured for:	Cohort 6-10	Cohort 11-15
Observations	34	34
R-squared within	0.976	0.978

Note: Significance levels are 0.01(***), 0.05(**) and 0.1(*). Clustered standard errors are in parentheses. All models control for the number of observations for each province. The reverse causality detection using model of lag educational budget share with province fixed-effect to explain educational inequality of opportunity is insignificant (p-value: 0.149 and 0.670 respectively for cohort 6-10 and 11-15 years old).

However, whether the lag of inequality indices is significant at 1% level, the reverse causality model[5] does not prove to be significant. Hence, there is a little evidence that inequality promotes the increase of educational budget, but the evidence is not in favor that educational budget share affects educational inequality of opportunity. Again, this causal evidence needs to be treated carefully and more evidence from later periods is required to evaluate this

[5] Results for the reverse causality model are available on request.

conclusion. Nevertheless, evidence from the World Bank (2007) revealed the similar path that the poorer districts allocated more for education compared to the richer districts.

4.3. Educational mobility and the role of pre-determined *circumstances* in driving educational achievements.

This section aims at examining the influence of pre-determined *circumstances* in the educational attainments of the two cohorts of Indonesian students here analyzed and so at getting a first glimpse on the extent to which these *circumstances* are sticky across generations of the same household.

As a first explorative step we cover adults or individuals who graduated or dropped out since the first period of observation and apply a sequential response model (Maddala, 1983; Mare, 1981) in order to assess the association of predetermined *circumstances* with the decision of an individual to continue or to exit school at each level.

More specifically, we use a sequential logit model that considers the sequence of binary response variable. It allows the explanatory variables to unequally influence the probability to stay in one level or move on to the next level. Moreover, the probability to be in one level takes into account the probability to be in the previous level. Educational levels fit into this modeling strategy as, in order to graduate from primary school, one needs to be enrolled in primary school. Then the decision to be made is either to stay in that level and never graduate (i.e. drop out/exit) or to complete primary school (graduate)[6].

We therefore exploit the longitudinal dimension of our data by following individuals who either left of graduated from each school level by the last wave of the survey in order to assess the extent to which pre-determined, inherited *circumstances* (such as the socio-economic status of the family observed in the first wave) affect individual probability to proceed towards further levels of schooling.

We code the sequential steps from entering primary school to entering higher education as an ordinal variable which ranges from 1 (lowest level) to 7 (highest level)[7] and run separate sets of regressions for the two five-years cohorts of individuals sampled. Results are reported in Tables 5 and 6.

[6] See Figure A1 reported in the Appendix:
[7] See Table A2 reported in the Appendix

Our findings show that parental education positively influences school survival across most of the levels of education. Among both cohorts of students, we observe that maternal education positively affects the probability of being enrolled in junior and in senior high school and, for the oldest cohort, it is also significantly associated (although with a relatively smaller coefficient) with higher odds of proceeding towards higher levels of education after graduation from senior high school.

Table 5: Sequential Logit model for educational levels. Results for Cohort 6-10

	1 vs 2 – 7	2 vs 3-7	3 vs 4-7	4 vs 5-7	5 vs 6-7	6 vs 7
	(1)	(2)	(3)	(4)	(5)	(6)
Father year of schooling 1997	0.090	0.209***	0.066	0.194***	0.185**	0.355***
	(0.090)	(0.058)	(0.072)	(0.056)	(0.076)	(0.095)
Mother year of schooling 1997	0.210**	0.195***	0.090	0.222***	-0.159*	0.073
	(0.103)	(0.058)	(0.071)	(0.058)	(0.085)	(0.121)
Female	0.533	-0.277	1.117**	0.198	1.764***	1.088*
	(0.510)	(0.322)	(0.455)	(0.320)	(0.619)	(0.631)
Rural 1997	-0.987	-0.858*	0.809	-0.473	-0.297	0.993
	(0.967)	(0.463)	(0.525)	(0.393)	(0.713)	(0.884)
TV 1997	2.549***	0.029	-0.213	0.832**	-0.991	-0.190
	(0.637)	(0.365)	(0.480)	(0.365)	(0.784)	(0.803)
House 1997	0.139	0.701	-0.753	1.398***	0.912	1.560
	(0.983)	(0.546)	(0.659)	(0.522)	(0.668)	(1.036)
Other building 1997	0.333	-0.264*	0.931	0.671	0.594	1.339
	(1.009)	(0.642)	(0.801)	(0.599)	(0.627)	(0.849)
Farm land 1997	1.179*	0.062	0.119	-0.012	-0.249	-0.816
	(0.610)	(0.349)	(0.406)	(0.352)	(0.557)	(0.769)
Livestock 1997	1.380**	-0.159	0.200	0.035	-0.173	-0.812
	(0.615)	(0.346)	(0.434)	(0.322)	(0.485)	(0.667)
Vehicles 1997	-0.022	1.183***	0.264	-0.021	0.895*	0.539
	(0.485)	(0.338)	(0.403)	(0.318)	(0.507)	(0.833)
Household appliances 1997	-0.725	0.510	-1.094*	0.184	1.928**	0.290
	(0.541)	(0.420)	(0.598)	(0.439)	(0.931)	(1.405)
Receivables 1997	0.643	-0.432	0.365	-0.092	0.089	2.526***
	(0.862)	(0.505)	(0.673)	(0.500)	(0.690)	(0.710)
Jewelry 1997	1.107**	-0.537	0.490	0.146	-0.280	-0.083
	(0.535)	(0.331)	(0.374)	(0.324)	(0.475)	(0.709)
Electricity 1997	0.227	-0.200	0.074	0.191	-0.470	-1.045
	(0.475)	(0.411)	(0.553)	(0.417)	(1.006)	(0.961)
Observations	520					
Wald chi square	34.240***					

Note: Sample is delimited to individuals who stopped schooling by 2007 or graduated from senior high school by 2007. Robust standard errors are in parentheses. The estimation includes age as the control variable and sampling weight. Education levels are enter Primary School (1), graduate Primary School (2), enter Junior High School (3), graduate Junior High School (4), enter Senior High School (5), graduate Senior High School (6), enter higher education (7). Stata module for sequential logit model is seqlogit (Buis, 2007).

Father's education instead seems to positively affect the probability for both generations of entering junior and senior high school and of graduating from senior high school or even continuing towards higher levels of education. It can be observed that the magnitude of these probabilities is always larger for the youngest generations, which may imply that the importance of such *circumstance* in driving educational choices has grown over time.

Table 6: Sequential Logit model for educational levels. Results for Cohort 11-15

	1 vs 2 - 7	2 vs 3-7	3 vs 4-7	4 vs 5-7	5 vs 6-7	6 vs 7
	(1)	(2)	(3)	(4)	(5)	(6)
Father year of schooling 1997	0.467***	0.106*	-0.025	0.139***	-0.112	0.234***
	(0.129)	(0.060)	(0.138)	(0.039)	(0.071)	(0.060)
Mother year of schooling 1997	-0.125	0.243***	0.129	0.175***	0.199**	0.131**
	(0.132)	(0.068)	(0.161)	(0.046)	(0.086)	(0.052)
Female	0.290	-0.056	1.183**	-0.385*	1.150**	0.333
	(0.695)	(0.334)	(0.518)	(0.232)	(0.547)	(0.268)
Rural 1997	1.359**	0.497	0.033	-1.037***	0.123	-0.362
	(0.570)	(0.346)	(0.617)	(0.279)	(0.532)	(0.307)
TV 1997	0.200	0.186	0.627	0.749***	0.964	-0.311
	(0.656)	(0.418)	(0.581)	(0.272)	(0.651)	(0.519)
House 1997	-0.253	-0.395	1.146*	0.055	0.242	1.113***
	(1.470)	(0.707)	(0.695)	(0.430)	(0.674)	(0.389)
Farm land 1997	-0.588	0.370	0.489	-0.099	0.613	0.451***
	(0.684)	(0.384)	(0.450)	(0.251)	(0.594)	(0.274)
Livestock 1997	-0.074	-0.800**	-0.205	-0.307	0.240	-0.677**
	(0.659)	(0.314)	(0.576)	(0.238)	(0.612)	(0.302)
Vehicles 1997	0.862	0.968***	0.94	-0.115	0.205	0.094
	(0.654)	(0.344)	(0.576)	(0.238)	(0.466)	(0.308)
Household appliances 1997	1.805**	1.354***	0.076	-0.459	-0.453	0.708
	(0.757)	(0.443)	(0.854)	(0.385)	(0.750)	(0.704)
Receivables 1997	-0.629	-0.982*	0.812	-0.326	1.343	-0.468
	(1.244)	(0.504)	(0.861)	(0.395)	(1.146)	(0.446)
Jewelry 1997	0.120*	0.562	-0.208	0.699***	0.432	-0.087
	(0.712)	(0.362)	(0.488)	(0.235)	(0.486)	(0.273)
Electricity 1997	-0.323	0.142	1.411*	-0.059	0.685	0.266
	(0.754)	(0.152)	(0.765)	(0.392)	(0.911)	(0.683)
Observation	782					
Wald chi square	71.400***					

Note: Sample is delimited to individuals who stopped schooling by 2007 or graduated from senior high school by 2007. Robust standard errors are in parentheses. The estimation includes age as the control variable and sampling weight. Education levels are enter Primary School (1), graduate Primary School (2), enter Junior High School (3), graduate Junior High School (4), enter Senior High School (5), graduate Senior High School (6), enter higher education (7). Stata module for sequential logit model is seqlogit (Buis, 2007).

Similarly, when comparing the coefficients of "farm land", "livestock" and "jewellery" between the two cohorts, it can also be observed that wealth (measured in terms of ownerships of these assets) has become relatively more important in influencing the probability of successfully completing lower levels of education.

Apart from that, we can observe an improving trend in female students' performance at school. Whereas, among both generations of students, girls are more likely to successfully complete junior and senior high school, for the youngest generations, there seems to be greater (even though only significant at the 10%) odds of proceeding towards higher levels of education after senior high school.

When observing the results obtained from OLS estimates based on cross-section regressions of completed years of schooling observed in 1997 (see Table 7), it emerges that mother's and father's level of education matters remarkably for the educational achievements of their children and that this effect appears to be relatively stronger when considering the educational achievement of students aged 11 to 15 years old. There also positive and significant correlations between other measures of household socio-economic status (i.e. ownership of farm land, household appliances and television) and individual educational attainments.

Lastly, gender differences appear to be significant, with girls having slightly more years of schooling than boys. However, when we look at the panel data based- fixed-effects regressions, it emerges that whether-especially for the oldest cohort- there remains a positive correlation between most of the *circumstances* and educational achievement, statistical significance in the afore-mentioned variables vanishes. This may related to the fact that time effect absorbs much of other variables' effect.

Table 7: The influence of pre-determined circumstances on educational achievements.

Dependent variable: Years of schooling	OLS 6-10 (1)	OLS 11-15 (2)	F.E. 6-10 (3)	F.E. 11-15 (4)
Female	0.048	0.167**	-	-
	(0.071)	(0.078)		
Mother year of schooling	0.023*	0.057***	0.0003	0.010
	(0.013)	(0.014)	(0.013)	(0.013)
Father year of schooling	0.014	0.080***	-0.0006	0.004
	(0.013)	(0.014	(0.014)	(0.011)
Rural	0.028	-0.124	0.051	0.204**
	(0.091)	(0.096)	(0.089)	(0.099)
Television	0.294***	0.249**	-0.035	-0.061
	(0.103)	(0.118)	(0.048)	(0.069)
House	0.134	0.050	-0.096*	0.066
	(0.100)	(0.122)	(0.052)	(0.062)
Other buildings	0.043	-0.037	0.023	-0.084
	(0.120)	(0.116)	(0.046)	(0.052)
Farm land	0.022	0.184**	-0.052	-0.063
	(0.079)	(0.083)	(0.034)	(0.040)
Livestock	0.048	0.078	-0.045	0.062
	(0.079)	0.083	(0.033)	(0.040)
Vehicles	0.064	0.116	0.010	-0.032
	(0.080)	(0.091)	(0.036)	(0.041)
Household appliances	0.051	0.240*	-0.039	0.013
	(0.107)	(0.139)	(0.056)	(0.072)
Receivables	0.112	0.012	0.015	-0.005
	(0.116)	(0.121)	(0.041)	(0.045)
Jewelry	0.023	-0.039	-0.021	0.013
	(0.080)	(0.085)	(0.036)	(0.039)
Furnitures	0.022	0.441	-0.076	-0.065
	(0.195)	(0.293)	(0.145)	(0.139)
Other assets	0.019	-0.093	0.001	0.005
	(0.170)	(0.191)	(0.034)	(0.038)
Electricity	0.048	0.283*	-0.143**	-0.111
	(0.119)	(0.146)	(0.068)	(0.082)
2000	-	-	2.720***	2.808***
			(0.029)	(0.031)
2007	-	-	9.595***	5.891***
			(0.043)	(1.750)
Observation	1,815	2,195	4,073	3,588
Adjusted R-squared	0.034	0.145	0.976	0.947

Note: Significance levels are 0.01(***), 0.05(**) and 0.1(*). F.E. = Fixed Effects. Robust standard errors for OLS model or clustered standard errors for fixed-effects model are in parentheses. All models include longitudinal sampling weight. Model (1) includes province dummies in the analysis.

4.4. Persistence of unequal educational opportunities

We now turn into the analysis of inequality of opportunity at the individual level and consider the consequences that the burden of unequal opportunities in education has on a person's future life outcomes. By doing this, we can also get a clearer picture of the persistence or "stickiness" of the effects of inherited

circumstances and therefore their repercussions for intergenerational mobility. In particular, we look at the effects in terms of future education achievement and on earnings.

Table 8 shows the results for the effects that inequality of educational opportunity experienced in the past has on future school achievements (i.e. on years of school completed in 2007).

Table 8: Persistence in inequality of opportunity and future educational achievements.

Dependent variable:	6-10	11-15
Years of schooling 2007	(1)	(2)
Inequality of opportunity	2.2758***	4.785***
	(0.557)	(0.878)
Father year of schooling	0.054**	0.033
	(0.022)	(0.030)
Mother year of schooling	0.114***	-0.022
	(0.025)	(0.030)
Age	0.346***	0.073
	(0.045)	(0.049)
Female	0.353***	-0.132
	(0.122)	(0.148)
Rural	-0.377***	-0.106
	(0.144)	(0.187)
Tertiary 2007	0.631***	0.785***
	(0.145)	(0.137)
Observations	984	828
Adjusted R-squared	0.358	0.275

Note: Samples are students from cohorts 6-10 and 11-15 years old in 1997. Robust standard errors are in parentheses. Province dummies and individual weight are included as well.

We measure the 'lagged' or cumulated impact of inequality of opportunity by the fitted values of the educational achievement equation and, for the sake of interpretation, we normalize these fitted values in order to get an index which goes from 0 to 1. The larger is the value of this index, the larger is the amount of inequality of opportunities experienced in the past. We also include as simple controls some of the pre-determined *circumstances* and a dummy ("Tertiary 2007") which identifies the individuals who were able to continue to higher education after senior high school. The coefficient from this dummy should not be interpreted, yet it serves as an extension for years of schooling in higher education that we do not allow to enter in the left hand side. Through this fashion, our OLS model does the job as usual and tertiary dummy stretches the range of the response. It is sufficient to distinguish the effect for people with

and without higher education according the natural situation, but not too far from our response definition.

It can also be noted that whereas in the regression for the younger cohort most of the control variables are statistically significant, estimates obtained for the older cohort seems to be more robust as the effect of the *circumstances* is completely absorbed by the index of inequality of opportunity.

The coefficient on the inequality of opportunity index indicates that the increase of years of schooling from the observations who got the least pre-determined *circumstances* in their early ages (the standardized index of fitted values is 0) to the observations with the highest ones (the standardized index of fitted values is 1) is around 2.3 years for cohort 6-10 and around 4.8 years for the oldest cohort.

As these results suggest, there seems to exist a cumulated and persistent effect of pre-determined *circumstances*. The more educational opportunities are granted to a person on the basis of her inherited *circumstances*, the larger will be her educational reward also in the near future.

When looking at the results from a simple Heckman model estimating the association between earnings and inequality of educational opportunity (see Table 9), one can also see that "unfair" reward mechanisms tend to persist and be reflected in future earning perspectives. When *circumstances* play a large role in shaping the allocation of opportunities in school, they will continue to positively influence individual opportunities in the income space.

This finding is also important in such it shows the relevance of measuring and analyzing inequality of educational opportunities. It has been argued (see, for example, Waltenberg and Vandenberghe, 2007 or Peragine and Serlenga, 2007) that it might make very small sense to conceptualize and measure inequality of opportunity for children as –by reason of their young age and therefore lower maturity- they cannot be fully accountable for their *effort* and personal responsibility.

As implied by the results from Table 9, instead, there is a close and positive relationship between the role that *circumstances* played in the allocation of educational rewards during childhood and future earnings perspectives. Therefore, considering the distribution of young students' rewards according to *efforts* and *circumstances* is a very meaningful exercise in such it can tell by how

much the role of pre-determined *circumstances* in influencing opportunities (that, given limited responsibility of children, might be tolerated in the past) persist over the individual life's course.

Table 9: Persistence in inequality of opportunity. Wage equations.

Dependent variable: Log wage per day 2007	Cohort 6-10				Cohort 11-15			
	OLS		MLE		OLS		MLE	
	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years of schooling 2007	-	0.046* (0.025)	-	0.043** (0.022)	-	0.058** (0.025)	-	0.050** (0.021)
Inequality of opportunity	-	1.124*** (0.316)	-	0.917*** (0.269)	-	1.025*** (0.285)	-	0.728*** (0.254)
Married	-0.631*** (0.240)	-	-0.242 (0.181)	-	-0.425*** (0.117)	-	-0.074 (0.080)	-
Age	0.089** (0.044)	-	0.043 (0.030)	-	0.049* (0.031	-	0.052*** (0.020)	-
Female	-0.163 (0.115)	-	-0.151* (0.079)	-	-0.055 (0.093)	-	-0.099* (0.060)	-
Tertiary 2007	0.203 (0.309)	-	-0.052* (0.079)	-	0.345*** (0.130)	-	0.369*** (0.080)	-
Lambda	-0.038 (0.441)		-1.216** (0.140)		-0.522 (0.318)		-1.188** (0.076)	
Wald test	28.928***		28.126***		32.867***		22.029***	
Censored observations	560		560		816		816	
Uncensored observations	365		365		417		417	

Note: Samples are students from cohorts 6-10 and 11-15 years old in 1997 who stopped schooling by 2007. Robust standard errors are in parentheses for maximum likelihood estimation, usual standard errors for two stage OLS. Inequality of opportunity index is measured by the fitted values from cross-section estimation and normalized into the interval [0,1].

5. Concluding remarks

Educational outcomes are important means for achieving a wide array of important personal goals. Of course, having the opportunity of being well educated has also its intrinsic value; regardless of the effect education can have on other, contemporaneous or future, outcomes. Every person should be able to exert her fundamental right of being educated, but-of course- this doesn't

imply necessarily that everybody should achieve the same level of education. However, according to both ethical and efficiency-related arguments, the only source of inequality in educational achievements should be related to the heterogeneity in *effort* committed in studying, and not on inherited factors which are simply outside the scope of individual responsibility.

This simple consideration has motivated the present study which contributes to previous literature first, by accruing current knowledge on inequality of educational opportunities in a country, such as Indonesia, which has experienced remarkable high rates of economic growth as well as reductions in economic poverty and stands out pretty well when considering average national figures on education which largely benefited from massive supply side interventions which boosted school enrolment rates (Duflo, 2001). Yet, despite these gains, there are still two important challenges that the country needs to face: the first one is the increasing trend of income inequality and of inequality of opportunity along the health dimension (World Bank, 2014) and the other one related to large disparities within and between provinces and regions in many quantitative and qualitative indicators of school achievement (World Bank, 2011).

Second, we identified the factors (or "*circumstances*") that account most for overall inequality of educational opportunity and found that parental educational background is one of the most important predetermined *circumstances* that affect educational inequality of opportunity.

Additionally, the effect of predetermined *circumstances* is also not equal across educational level, particularly for sex. Girls have more chance to complete junior high school or to enter senior high school compared to the male counterparts.

We also contribute to previous literature on this field, by devising an "individual" index of inequality of opportunity, which is given by the fitted values representing the importance that, for each individual, cumulated *circumstances* have on her educational achievement. By using this index we were able to show how much persistence are these *circumstances* over the individual life's course.

We also observe a positive trend between inequality indices and educational budget share. This small evidence may suggest that the increase of inequality

caused the rise of educational budget share. Given that this is the case, educational policies may have considered inequality in their programs. But the lack of opposite evidence suggests that the effectiveness of educational budget to diminish educational inequality of opportunity is in question

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Appendix

Table A1: Descriptive Statistics

Variable	Obs.	Mean/proportion	Std.Dev.	Min.	Max.
Years of schooling	4382	4.232	2.360	0	11
Father's years of schooling	4088	6.378	3.940	0	12
Mother's years of schooling	4318	5.371	3.779	0	12
Female	4382	0.495			
Rural	4380	0.532			

Note: based on the sample of cohorts aged 6-10 and 11-15 observed in 1997.
Source: own elaboration on IFLS data

Fig. A1 Educational transition

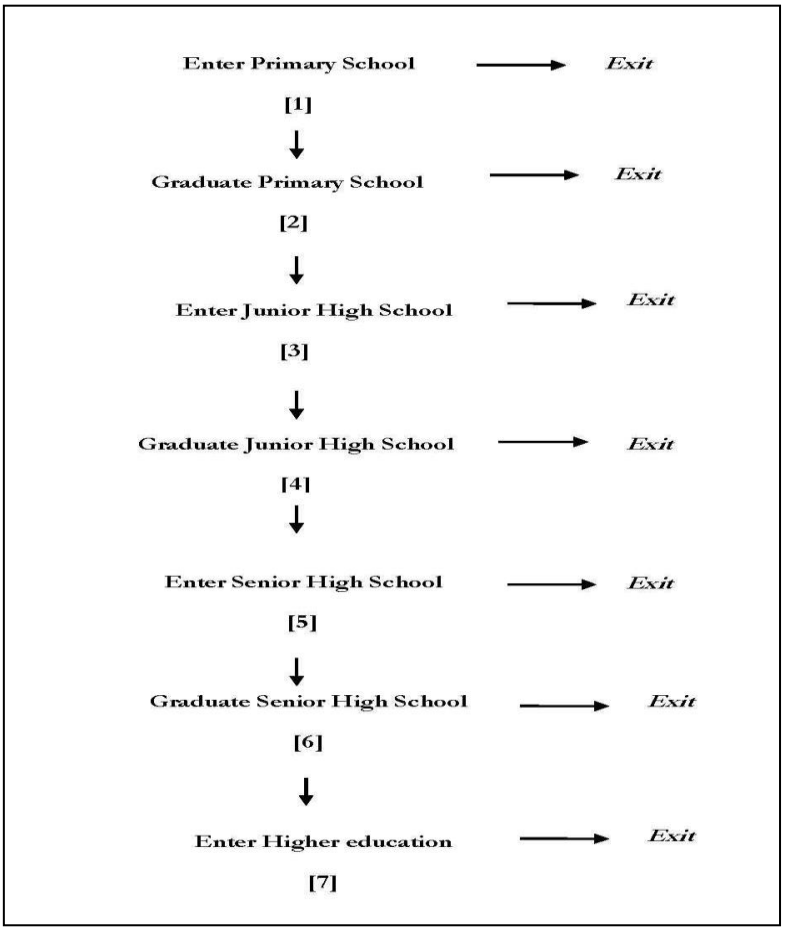

Table A2: Coding educational steps

Level	Value
Enter Primary School	1
Graduate Primary School	2
Enter Junior High School	3
Graduate Junior High School	4
Enter Senior High School	5
Graduate Senior High School	6
Enter Higher Education	7