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# Intergenerational Mobility and the Rise and Fall of Inequality: Lessons from Latin America

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**Abstract**

Countries with high income inequality also show a strong association between parents' and children's economic well-being; i.e. low intergenerational mobility. This study is the first to test this relationship in a between *and* within country setup, using harmonized micro data from 18 Latin American countries spanning multiple cohorts. It is shown that experiencing higher inequality in childhood has a negative effect on intergenerational mobility as adults. Furthermore, the influence of economic growth and public education is evaluated: both have a positive, significant, and substantial effect on intergenerational mobility.

**Keywords:** Inequality, Intergenerational Mobility, Equality of Opportunity, Human Capital, Growth, Development, Public Education, Great Gatsby Curve, Latin America. **JEL Classification**: D63, I24, J62, O15.

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# 1 Introduction

The view of researchers and the public on inequality has been changing over the course of time. While the classical approach suggested that inequality might be beneficial because of his motivating nature (Keynes, 1920), it changed to be seen as simply part of the process of economic development with no direct causal interrelation (Kuznets, 1955). Later, economists theorized that the shape of the income distribution has a significant impact on growth rates and that, for instance, higher levels of inequality have a negative impact on economic performance (Alesina and Rodrik, 1994; Atkinson, 1997; Bénabou, 1996; Corneo and Jeanne, 2001; Galor and Zeira, 1993; Persson and Tabellini, 1994).[1] Finally, empirical studies evidenced a strong association between inequality and clearly detrimental patterns for a society, like higher crime, drug use and persistent poverty (Wilkinson and Pickett, 2009), and recently an OECD report even titled *"Why Less Inequality Benefits All"* (OECD, 2015). Actually, egalitarian theories of justice since the influential works of Rawls (1971) and Sen (1980) suggest that, from a normative point of view, the key to understand whether it is worth to care more or less about the income distribution within a society - i.e. on (in)equality of outcomes - is the evaluation of (in)equality of opportunities.

Equality of opportunity is a long studied subject and mostly one of the primary goals of policy makers. The fundamental discussion concerns hereby the distinction between inequality of outcomes resulting from *individual efforts* and inequality of resources deriving from *given circumstances* (Roemer, 2000). Recently, the topic has been extensively debated because of an alarming finding: In countries where income inequality is high, there is also a strong association between parents' and children's economic well-being (i.e. low intergenerational mobility).[2] Indeed, the negative relationship between inequality and intergenerational mobility has yet been hypothesized in past by some influential theoretical contributions; starting from the seminal studies by Becker and Tomes (1979) and Loury (1981), to macroeconomic models among others by Galor and Zeira (1993), Owen and Weil (1998), Maoz and Moav (1999) and Hassler et al. (2007). The presence of such a relationship would mean, in simple terms, that when inequality is high, the same families persist over (two or more) generations at the top or bottom of the income distribution. A graph visualizing this phenomenon across countries is well-known as the *Great Gatsby Curve*.[3]

Finding a causal link between an unequal distribution of income, low social mobility and the persistence of economic inequality would probably be the strongest motivation, especially for policy makers, to care about income inequality. However, most empirical studies on the relationship between income

[1] A stimulating survey on researcher's view on inequality can be found in Galor (2009). See also Furman and Stiglitz (1998) for an overview of the consequences of inequality for economic growth.

[2] The concepts of equality of opportunity and social intergenerational mobility are arguably very close to each other. Brunori et al. (2013) find even a strong correlation between common indices of inequality of opportunity and measures of intergenerational mobility. For some viewpoints, and a discussion on similarities and differences of the two constructs, see Roemer (2004, 2012) and Corak (2013a).

[3] The *Great Gatsby Curve* was addressed by Alan Kruger as chairman of the council of economic advisers in a speech titled "The Rise and Consequences of Inequality in the United States" on January 12, 2012, at the Center for American Progress. The original analysis and a discussion can be found in Corak (2013b,a).

inequality and intergenerational mobility focus on comparisons between countries. Hence, the existing evidence so far does not allow to exclude that the association might be merely driven by cross-country heterogeneity, for instance in institutions. Only few recent studies investigate the relationship restricting the analysis within one single country (e.g. Chetty et al., 2014b,a; Güell et al., 2015). So, more research with comparable data on multiple countries and cohorts is crucial for our understanding about the interplay between income inequality and intergenerational mobility (as pointed out for example by Jäntti and Jenkins, 2015). The purpose of the present study is to deepen our understanding of this relationship, applying a profound empirical analysis on harmonized survey data for 18 distinct countries and spanning multiple cohorts. Its main contribution is to test whether a negative relationship exists in a between *and* within country set up.

The laboratory for this exercise is Latin America: Two different sources of harmonized household survey data allow to perform such a comparative analysis, controlling for cross country heterogeneity. An interesting fact is that while worldwide inequality has been constantly rising, Latin American countries have followed this trend for a while, and eventually many of them experienced a significant decrease in inequality in the last decade (Gasparini et al., 2011; Cord et al., 2013). So, sufficient variation of the explanatory mechanisms should be given at the between as well as at the within country level. Three analytical steps are pursued: First, a simple stylized analysis is applied to account for the displacements of countries along the *Great Gatsby Curve*. Then, the association between inequality experienced in childhood (and adolescence) and intergenerational mobility as adults is estimated. Finally, the influence of economic growth and public expenditure in education is evaluated; two features which has been theorized in past to influence inequality and intergenerational mobility.

The main findings are the following: Estimations performed on two different data sets all confirm the link portrayed by the Great Gatsby Curve. Indeed, individuals who experienced higher (lower) inequality in childhood or adolescence – i.e. when parental investment in human capital is crucial – show significantly lower (higher) intergenerational mobility as adults. These results are robust and do not change adopting different specifications. Further analyses show, that one of the driving forces behind this relationship might be economic growth, and that public expenditures in education show the expected positive association with intergenerational mobility. Altogether, the crucial importance of private and public investment in children's human capital is confirmed; the latter being a channel to support higher intergenerational mobility. This last finding has important implications for public policies to enhance equality of opportunity in a society.

The remainder of the paper is organized as follows: Section 2 reviews the theoretical and empirical literature on the relationship between inequality and intergenerational mobility. Section 3 describes the data and presents the applied measurements. In Section 4 the results are presented in four distinct Subsections: 4.1 shows estimated intergenerational mobility rates of an older and younger cohort in 18 Latin American countries; 4.2 provides a stylized analysis on inequality and mobility in Latin America and shows the within country displacements on the Great Gatsby Curve; 4.3 displays the estimated association between inequality experienced in childhood and intergenerational mobility as adults; 4.4 visualizes

the magnitude of factors determining the intergenerational persistence of socioeconomic status. Section 5 concludes.

## 2 Inequality and Intergenerational Mobility: The State of the Art

The relationship between inequality and intergenerational mobility, as a broad measure of equality of opportunity, is of crucial importance for various dimensions of economic development.[4] Indeed, recent studies on the relationship between income inequality and growth found opposite effects when the distribution of income is determined by inequality of opportunities or by inequality of efforts, being negative in the first and positive in the second case (Marrero and Rodríguez, 2013). Similar results have been found by authors who dedicated to the study of inequality of educational attainments: They confirm that rising human capital enhances growth and economic development, but only conditional on the degree of educational inequality (Cuaresma et al., 2013; Sauer and Zagler, 2014). Education takes place early in life and shapes strongly individual opportunities. The choice of certain educational tracks and first educational attainments are strongly determined by circumstances out of the influence of the individual (for a recent survey, see Heckman and Mosso, 2014). Hence, these findings can be interpreted as further evidence for the detrimental impact of inequality of opportunities, and the crucial role they play in a comprehensive analysis of income inequality.

In past, the subject has been analyzed in some influential theoretical contributions which conceptualize the mechanisms behind the intergenerational transmission of inequality.[5] The main intuition is that *family endowments* inherited from parents to children play a crucial role in the mechanisms underlying the transmission. Moreover, rising income inequality between families leads to higher inequality of investment in children's human capital, and thus to lower upward mobility of children descending from poorer households. This implications arise from the seminal models by Becker and Tomes (1979, 1986), Loury (1981) and the adaptations done by Solon (1992).[6] Later models built mainly on this framework (e.g. Owen and Weil, 1998; Maoz and Moav, 1999; Galor and Zeira, 1993; Hassler et al., 2007). Especially in this last branch of studies, an important weight is attributed to credit market constraints that limit private investment in human capital, and to public investment in human capital as one of the major contrasting forces of this dynamic.

The theoretical models are basically built on the assumption that parents derive utility, apart from their present consumption level, also from the future utility of their children. Therefore, parents invest mainly in the human capital of their children to raise their future income and, thus, utility. If the investment is exclusively private, budget constraints limit the investment choices of families and lead - especially in presence of credit market imperfections - to the persistence of inequality from one generation to the next;

[4] The conceptual discussion on equality of opportunity has its origins in Philosophy (see among others Dworkin, 1981b,a). For a recent review, see Roemer and Trannoy (2015).

[5] Actually, the idea that in Capitalist societies class reproduction and the persistence of inequality depend mainly on the initial distribution of wealth is the core of Marx's analysis and finds space in even older thoughts.

[6] Extensions to Gary Solon's first contribution are Solon (1999, 2002, 2004, 2014).

i.e. poor parents are unable to invest in the human capital of their children, who therefore are unable to afford better income opportunities for themselves and to climb up the social ladder. Consequently, when income becomes more unequally distributed, inequality of investment in children's human capital rises, causing low intergenerational mobility, social stratification, and even higher income inequality in the following generation.

Empirically, the question if parental income and credit constrains are determinant for disparities in human capital investments is far from being solved, as pointed out for example by Piketty (2000) in an older review about intergenerational mobility, and Black and Devereux (2011) in a more recent one. Actually, the association might be even stronger, if altruism and the propensity to invest in children's human capital are positively associated with (relative and absolute) income. Furthermore, other direct and indirect effects of certain parental background features play an important role, like parental education or cognitive abilities (e.g. the possibility to support children in their educational career and the informational advantage about the value of certain degrees on the labor market), as well as so-called network and neighborhood effects (Benabou, 1996; Durlauf, 1996). Genetic transmission of abilities might also be a significant channel, as accounted for in some of the above mentioned models; although relatively weak in comparison to other family endowments as recent research has shown (Black et al., 2015).[7] What is sure, is that albeit credit constrains are only one of many factors determining the formation of human capital, and simply providing income transfers to poor families would certainly not solve the problem of inequality in children's opportunities (as pointed out e.g. by Heckman and Mosso, 2014), the cross country relationship between inequality and mobility shows that it is still a factor to account for seriously.

Observing the dynamics of the process within a society, as a logical consequence of the above explained mechanisms, we would expect rising inequality to cause lower intergenerational mobility. However, although the cross country association between income inequality and intergenerational mobility has been investigated extensively (e.g. Aizer, 2014; Andrews and Leigh, 2009; Björklund and Jäntti, 2012; Blanden, 2013; Brunori et al., 2013; Checchi et al., 1999; Corak, 2013b,a; Holter, 2015; Jerrim and Macmillan, 2015), within-country evidence is still rare on this point. The influential works by Chetty et al. (2014b,a) use administrative data on income to estimate intergenerational mobility trends across geographical areas in the US. Their results show that mobility varies significantly across areas, and that areas with high inequality display low rates of mobility, as predicted by the theoretical models and evidenced by the Great Gatsby Curve. This is confirmed by the analysis of Güell et al. (2015) on a sample of 103 Italian provinces using a novel measurement of intergenerational mobility based on the correlation of economic well-being by rare surnames.[8] However, observing time trends, Chetty et al. (2014b) find that intergenerational mobility - measured as the conditional correlation of parents' and childrens' rank in the income distribution, children's college attendance, and other measures - has not fallen in the US despite of rising inequality, confirming earlier findings by Lee and Solon (2009). The authors explain this by the fact that the rise of inequality in the US was mainly driven by top incomes (Piketty and Saez,

[7] For a review on so-called "Nature and Nurture" effects, see Sacerdote (2011).
[8] This measure of intergenerational mobility was first proposed by Guell et al. (2015).

2003), while mobility depends to a larger extent on "middle class" inequality (i.e. among the bottom 99 % of the income distribution) as their own findings highlight. One of the very few studies analyzing cross sectional inequality and intergenerational mobility trends in a developing country is Fan et al. (2015) for China. They find evidence for an existence of a Great Gatsby Curve within China, observing declining mobility rates along with rising inequality during the economic transition. The closest approach to the one applied in the present study is a recent analysis by Cingano (2014) on OECD countries using PIACC data, which confirms the negative relationship between inequality and intergenerational mobility.

The application here is on Latin America, where income inequality has been falling during the last decades. Following the insights given by the theoretical models, a decline in the dispersion of parental investment in children's human capital should be expected as well (ceteris paribus), and younger generations should display higher intergenerational mobility. However, parental investment is only one aspect. Indeed, it has to be taken into account that the interplay between three institutions determines the amount of intergenerational mobility in a society: The family, the market, and the state (Corak, 2013b). The family, mainly due to the inheritance of endowments from parents to children, for example trough investments in human capital, genetic transmission of abilities, or the heritage of certain values.[9] On the latter, empirical research found for example a positive association between income inequality and stronger work ethic (Corneo and Neher, 2013) what might lead to higher intergenerational mobility.[10] The market, since higher returns to investment in human capital might act as an incentive for families to invest more and, thus, raise mobility (Solon, 2014). The state, providing public investment in human capital for families that cannot afford an efficient amount of it due to budget constrains (Davies et al., 2005). Additionally on this last point, Ichino et al. (2011) argue that political institutions influence strongly the degree of persistence of socioeconomic status in a society and are one of the main explanations of cross-country differences in intergenerational mobility estimates.

Another important aspect might be the timing of the investment in human capital. As pointed out, among others, by Heckman and Mosso (2014), investments are more effective at earlier ages, while interventions in adolescence may have only short run effects. Anyway, as various branches of research evidenced, the role of parental background for children's outcomes is important over various stages of life (Ermisch et al., 2012).

[9] Some authors related also different fertility choices of poor and rich households to the persistence of poverty (e.g. Moav, 2005).

[10] Furthermore, Corneo (2013) develops a model where the transmission of values towards a stronger work ethic depends on the characteristics of the labor market, as well as on the amplitude of the welfare state. Indeed, he empirically finds a correlation between higher intergenerational (occupation) mobility, and the generosity of unemployment benefits.

# 3 Data & Measurement

## 3.1 Data

Studies on intergenerational mobility are always methodically and conceptually constrained by the available data.[11] Ideally, the requirement for an empirical analysis of intergenerational mobility is the availability of valid measures (or good proxies) for permanent income of parents and children. Furthermore, for cross-country comparisons to be meaningful, the data must be as comparable as possible between countries. Research on intergenerational mobility in developing countries faces a further complication: Since panels are an absolute rarity in developing countries, there are only two ways to obtain information on the economic outcomes (e.g. educational attainments, occupation) of both, parents and children. The first, is to restrict the analysis to children and parents still living in the same household. The second, is to use the information given by retrospective questions on parental characteristics. Estimates deriving from the first should be biased by the truncation and non representativeness of the sample, since adult children which left the household because of marriage, college or other reasons are not taken into account.[12] The second alternative should, therefore, be more appropriate to study intergenerational mobility. However, not all surveys work with retrospective questions to obtain information on parental characteristics.

The data sources used in this study fulfill all the required prerequisites: First, the public opinion survey *Latinobarometro*, which since 1995 records individual and household characteristics of a nationally representative sample of adult respondents in 18 Latin American countries, including questions about own and parental education (since 1998).[13] Second, a newly created micro data set which pools several household surveys for 9 Latin American countries; all surveys which could be identified to ask directly with retrospective questions about the educational attainments of parents.[14] While the *Latinobarometro* data is harmonized ex-ante, the data set which comprises different household surveys is harmonized ex-post. The countries included in the latter are Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, and Peru. Tables A1 to A4 show some weighted descriptive statistics of the samples which comprise 120,166 (*Latinobarometro*) and 390,404 (*Harmonized Household Surveys*) individuals,

[11] The three "W" of mobility analysis, as termed by Jäntti and Jenkins (2015): mobility of *What*, among *Whom*, and *When*. See also Björklund and Jäntti (2012) for an overview.

[12] Although intuitively the problem is clear enough, research on the actual degree of the bias is rare. Only recently, a study by Emran et al. (2015) has shown that the bias is severe on measures of mobility that do not take into account the variances of the dependent and independent variable, like the intergenerational regression coefficient, and less strong for normalized measurements, like the standardized intergenerational correlation.

[13] The Latinobarómetro survey comprises every year a sample of 1000 to 1200 individuals per country. It is carried out by local firms under technical supervision of the Latinobarómetro Corporation, a private non-profit organization based in Santiago (Chile). The study receives financing from Latin American and non-Latin American governments, the private sector, and international organizations. Among others: IADB (Inter-American Development Bank), UNDP (United Nations Development Programme), AECI (Agencia Española de Cooperación Internacional), SIDA (Swedish International Development Cooperation Agency), CIDA (Canadian International Development Agency), CAF (Corporación Andina de Fomento), OAS (Organization of American States), United States Office of Research, IDEA International, UK Data Archive. The Dominican Republic was included for the first time in 2004, raising the country total to 18.

[14] The data presented here is used in a parallel project to compute a new macro data set of intergenerational mobility trends over a span of more than 50 years (Gasparini, Neidhöfer and Serrano, *forthcoming*).

who were born after 1970, at least 18 years old when the survey was conducted, and with available information on own and parental education.[15] The number of observations by country is much more balanced in Latinobarometro, ranging from 3,926 in the Dominican Republic to 8,035 in Mexico, while in the second data set it varies from the 2,360 observations of Nicaragua to the 130,750 of Chile.

Since Latinobarometro is a survey created appositely for cross country comparisons, the means of year of birth, age, and sex are rather uniform across countries, while in the data set constructed from various household surveys there are notable differences. Also, the codification of completed years of education of parents and children is uniform in Latinobarometro, but diverges between countries in the other sample. This is due to the fact that in some countries the definition of education was expanded to higher ordered degrees in some survey years, as for example a doctoral degree in Panama, coded with 24 years of education. In order to make use of all the available information, the main analysis with the household survey data is performed keeping the different specifications across countries and surveys. However, suitable robustness checks are performed, coding years of education uniformly across countries, based on levels of education indicated in all surveys according to the same standard, and following the definition made by Latinobarometro.[16] As can be seen clearly, the two data sets are fundamentally different from each other, and the samples of single countries are not necessarily comparable between data sets. For instance, while the samples of Chile and Colombia seem to be rather similar between Latinobarometro and the harmonized household survey data set, in other countries, especially in Ecuador and Nicaragua, less cohorts are available in the latter. Also, after excluding individuals without information on parental education, the distribution of males and females is unbalanced in the pooled survey data of some countries.[17] Due to all these reasons, the descriptive analysis is not comparable between the two data sets, while the within-sample analysis maintains its validity and is particularly useful.

Information on income inequality are extracted from the *Socio-Economic Database for Latin America and the Caribbean* (SEDLAC; CEDLAS and The World Bank), which is the main source of information regarding inequality, poverty and other labor market or social indicators for Latin America.[18] The SEDLAC data relies on harmonized micro data from over 300 household surveys carried out in 24 Latin American and Caribbean countries and represents in each period more than 97 % of the total population in the region.[19] For the main analysis, the Gini coefficient of disposable household per capita income

[15] A priori, the analysis could be sensitive to the chosen age restriction, because some individuals might not have completed yet their educational career at this age. The age when education was finished by individuals, included as question in the 2013 wave of the Latinobarometro survey, shows that the mean age when education is completed in Latin America is 17.7, ranging from a mean age of approximately 15 in Honduras to approximately 20 in Brazil. Suitable robustness checks imposing different age restrictions (e.g. older than 21) has been performed, with no significant changes in the main analysis. The results can be found in the Online Appendix.

[16] As usual in the literature, the highest parental degree – or in case of missing information of one parent, the only one available – is used to measure parental education. The codification of completed years of education in Latinobarometro and the alternative specification in the household survey sample, are shown in the Online Appendix. The specification used in the main analysis with the latter follows the actually indicated completed years of education in the respective household survey.

[17] This is especially evident in Peru, where nearly 80 % of the sample are men. The reason in this case, is that from 2002 on, in the ENAHO household survey the education of parents is asked only to household heads who are, in most cases, male.

[18] The date of the statistics used in this version of the paper is *November 2014*.

[19] Most household surveys included in SEDLAC are nationally representative. However, in some countries also surveys are

is used, for which the first spells varies from 1974 (in Argentina) to 2001 (in Colombia).[20] Information on economic growth, measured by GDP per capita in USD (constant at 2005 market prices), and on public expenditures in education, measured as percentage of GDP, derive from World Bank data and are reported yearly since 1970.[21] All the used data sources share the great advantage of assuring the best possible comparability between different countries and over time.[22]

### 3.2 Measurement

The established way to measure intergenerational mobility in a society, is to estimate the following equation:

$$Y^t = \alpha + \beta Y^{t-1} + \varepsilon,$$

where $Y$ is a measure of permanent income or lifetime earnings for two subsequent generations within a family. The coefficient $\beta$, thus, measures the degree of persistence in socioeconomic status from parents $(t-1)$ to children $(t)$. Higher values of $\beta$ display a higher association between parents' and children's well being, and therefore a lower intergenerational mobility, and vice versa.

The information which is more likely to be available in household surveys for both, parents and children, is completed years of education. In absence of accurate information on long-run earnings, using education is arguably the best way to identify (lifetime) socio-economic status, since the use of income "snapshots" to approximate (*log*) lifetime earnings leads to serious bias in the intergenerational mobility estimates (Nybom and Stuhler, 2016).[23] As Blanden (2013) shows with a small sample of countries, intergenerational mobility estimates obtained using educational attainment are highly correlated across countries with the best available estimates using income.

A comparable measure of intergenerational mobility across different countries and over different time periods is obtained through a linear transformation of parents' and children's educational attainments. The new outcome variable is centered around 0 which displays the mean years of education of even-aged

used which cover only urban areas (in Argentina, Bolivia, Colombia, Paraguay and Uruguay). Still, in these countries the urban population represents the vast majority of the national population (e.g. 85 % in Argentina). Further computations make the data comparable if deriving from different surveys for the same country, and fill up missing data points by interpolation; estimates obtained without interpolation are however not significantly different to the main results in this study. For further information on methodological issues see "A guide to the SEDLAC: Socioeconomic Database for Latin America and the Caribbean." (CEDLAS and The World Bank, 2012). For an exhaustive discussion of the SEDLAC data see also Bourguignon (2015).

[20] Results do not change when using the Gini coefficient of equivalised household income, instead.

[21] In the estimations concerning the early childhood period, the starting age of compulsory education is used instead of public expenditures in education.

[22] While the Latinobarometro survey is designed for comparable analyses between countries and over time, household surveys are not uniform across Latin American countries and significantly differ in geographical coverage and questionnaires, sometimes also within countries over time. Although important improvements have been made by Latin American governments in the last years, the issue of comparability is still a great concern. However, the SEDLAC data is made with the greatest possible effort to make statistics comparable across countries and over time by using similar definitions of variables and by applying consistent methods. The same applies for World Bank data.

[23] Studies for the US have shown that proper measurements of intergenerational persistence of income can only be obtained with more than ten years of income spells for both, parents and children (Solon, 1992).

people, born in the same year, of the same sex, and living in the same country.[24] The obtained regression coefficient is thus a measurement which is close to the well-known intergenerational correlation, but has the main advantage to consider the inequality transmission of human capital, a dimension which gets lost if applying the latter.[25]

The performed transformation of completed years of education has several further advantages: First, it offers an intuitive way to evaluate the relative position of parents and children with regard to their reference group, yielding an outcome variable which is probably more indicative of socioeconomic status than educational attainment alone. Second, the assumption of linearity is less strong than using completed years of education without normalization, as Figure A1 highlights. Third, the obtained measurement is conceptually closer to rank-based measures, which in the case of income have been proved to be more robust and less affected by bias (Chetty et al., 2014a; Nybom and Stuhler, 2015). It should therefore be the appropriate measure to compare different countries and cohorts consistently.

In the first part of the analysis, the following baseline equation is estimated separately for people born 1980 to 1987 (older cohort) and 1988 to 1995 (younger cohort):

$$y_i = \alpha + \beta y_i^p + \delta X_i + \varepsilon_i,$$

where $y_i = (Y_i - \overline{Y})/\overline{Y}$ and $y_i^p = (Y_i^p - \overline{Y^p})/\overline{Y^p}$ indicate the *relative educational position* with respect to the reference group, being $Y_i$ the completed years of education of individual $i$, $Y_i^p$ of her parents, and $\overline{Y}$ ($\overline{Y^p}$) the mean years of education of her (her parents') reference group; i.e. people of the same age, sex, country and cohort. $X_i$ comprises controls for *sex*, *age (polynomial),* and *survey year*.[26]

In the second part, macro-level characteristics are included in the estimations to analyze their effect on intergenerational mobility. For this purpose, the variable for parental educational position is interacted with the relevant macro-level variables. What is hereby of crucial importance, is how the macro-level characteristics are associated to individuals. Actually, measuring inequality and intergenerational mobility at the same time (e.g. in the same year) would imply the strong assumption that countries are in the steady-state, and within country differences would not be caught up properly. The applied strategy

[24] Since it would make no sense to compare the parents of people of different sex and age distinctly, the measure for parental education is normalized only by country and year of birth.

[25] The intergenerational correlation is obtained multiplying the regression coefficient by the ratio of the standard deviations of parents' and children's outcome and, thus, adjusts for differences in inequality between generations. This is intentionally avoided here, since the inequality of human capital is an interesting dimension which should not be taken out of the evaluation. Anyway, to provide a comparison to the previous literature, also estimates have been computed i) without any normalization of completed years of education and ii) using the Z-Score of parental education (a measure which should equal the intergenerational correlation). All estimations basically confirm the main results and can be found in the Online Appendix.

[26] For reasons of readability, the displayed equation simplifies to one single country. In Table 1, the result are obtained with the pooled sample by estimating the fully interacted model

$$y_i = \alpha + \beta_1 y_i^p + \beta_2'(y_i^p \cdot C_i) + \zeta C_i + \delta'(X_i \cdot C_i) + \varepsilon_i,$$

where $C$ is a vector of dummy variables being 1 for $i$'s country and 0 otherwise, and $\beta_2$ the vector of coefficients. The measure for intergenerational mobility is thus $\beta_1 + \beta_2$ in this case. Including cohort fixed effects do not change results significantly, neither in this nor in the subsequent applications.

takes these aspects into account, and evaluates the macro-level characteristics when the individual was in a period of life when investments in human capital are essential.[27]

Three lifetime periods are identified where parental (or public) investment in human capital is essential: (A) *Early childhood,* defined as the age interval from 0 to 6, (B) *Primary school age*, from age 6 to 12, and (C) *Adolescence*, from age 12 to 18. Then, the mean of the relevant macro characteristics are matched to individuals according to the country where they live and the respective age intervals mentioned before.[28] This method allows to have enough variation in the independent variables; not also between but also within countries as shown in Figure A2.

Formally, the following set of four equations is estimated separately for the three specifications (A), (B), and (C) mentioned above:

$$y_{ic} = \alpha + \beta y^p_{ic} + \delta X_{ic} + \gamma_1 \cdot y^p_{ic} \cdot Q_c + \tau_1 Q_c + \varepsilon_{ic}, \tag{1}$$

$$y_{ic} = \alpha + \beta y^p_{ic} + \delta X_{ic} + \gamma_1 \cdot y^p_{ic} \cdot Q_c + \tau_1 Q_c + \vartheta_c + \varepsilon_{ic}, \tag{2}$$

$$y_{ic} = \alpha + \beta y^p_{ic} + \delta X_{ic} + \gamma_1 \cdot y^p_{ic} \cdot Q_c + \tau_1 Q_c + \vartheta_c + \gamma_2 \cdot y^p_{ic} \cdot G_c + \tau_2 G_c + \varepsilon_{ic}, \tag{3}$$

$$y_{ic} = \alpha + \beta y^p_{ic} + \delta X_{ic} + \gamma_1 \cdot y^p_{ic} \cdot Q_c + \tau_1 Q_c + \vartheta_c + \gamma_2 \cdot y^p_{ic} \cdot G_c + \tau_2 G_c + \gamma_3 \cdot y^p_{ic} \cdot Z_c + \tau_3 Z_c + \varepsilon_{ic}. \tag{4}$$

Equations (1) to (4) successively add the relevant macro characteristics to the baseline equation; subscript $c$ is added and denotes $i$'s country of residence. Hereby, (1) includes only inequality ($Q_c$), (2) also country fixed effects ($\vartheta_c$), (3) additionally economic growth ($G_c$) and, finally, (4) public investment in human capital ($Z_c$), all centered on the sample mean. The $\gamma$-coefficients signal a positive or negative change in the slope of the association of parents' and children's socioeconomic status.[29] Standard errors are clustered by country and year of birth.

# 4 Empirical Evaluation

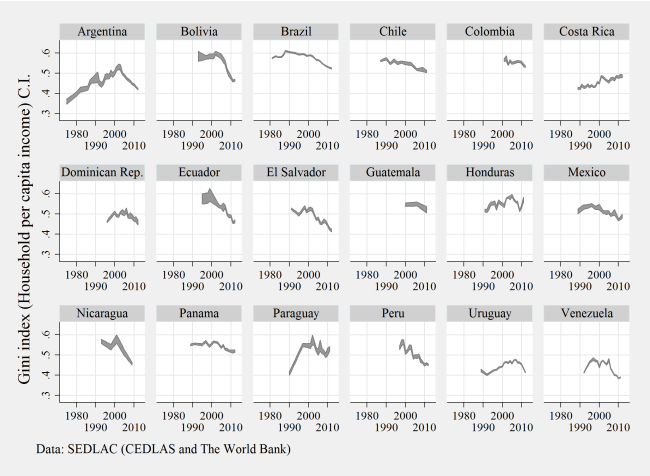
## 4.1 Inequality and Intergenerational Mobility in Latin America

Latin America is an interesting laboratory to analyze inequality and intergenerational mobility. On the one hand, the region is still characterized by high levels of inequality which are among the highest from a global perspective (Alvaredo and Gasparini, 2015; Lustig et al., 2013). But on the other hand, while

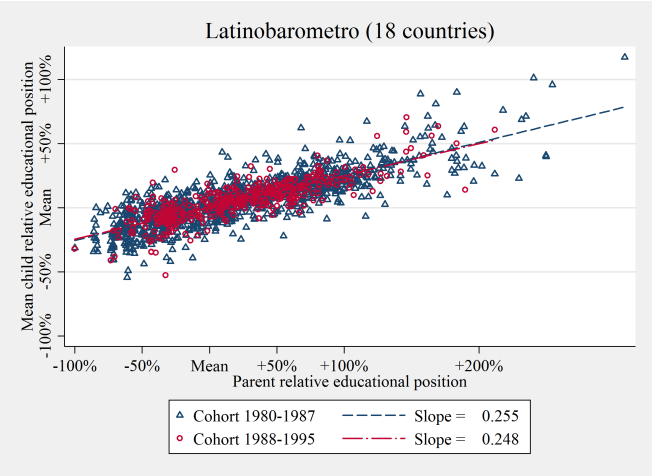
[27] Of course, investment in human capital may be made at every stage of life and up to older ages. However, as shown by many studies, human capital investments are more effective and have a longer lasting effect, the earlier they take place. See among others Ermisch et al. (2012); Heckman and Mosso (2014) for an overview of the importance of investment in human capital at different moments of children's lifetime.

[28] A very simple example taking inequality measured by the Gini coefficient as macro level variable: For an individual born 1986 in Argentina, the mean of the Gini coefficient in Argentina from 1986 to 1992 (0.454) is associated to *early childhood*, from 1992 to 1998 (0.469) to *primary school age*, and from 1998 to 2004 (0.509) to *adolescence*.

[29] A similar methodology has been adopted by Mayer and Lopoo (2008) to evaluate the relationship between government spending and intergenerational mobility, and by Schütz et al. (2008) to analyze the effect of certain characteristics of the education system on equality of opportunity. In a recent study, Cingano (2014) compares similarly the mean effect of inequality on years of schooling, literacy and numeracy of people with different parental educational background (low, middle, high) using PIACC data.




(a) Inequality - Gini of disposable household per capita income (Data: SEDLAC)




(b) Intergenerational Mobility - Mean child position by parental background (Data: Latinobarometro, own estimates)

Figure 1: Inequality and Intergenerational Mobility in Latin America

worldwide inequality has been rising, most Latin American countries experienced a significant decrease in inequality in the last decade (Gasparini et al., 2011; Gasparini and Lustig, 2011; Cord et al., 2013). Figure 1a shows income inequality trends in Latin America.

Many studies dedicated in past to the study of intergenerational mobility in one or more countries in Latin America. All basically confirm that mobility in Latin America is very low, as typically would have been expected for development countries with high levels of inequality (among others Andersen, 2003; Azevedo and Bouillon, 2010; Behrman et al., 2001; Binder and Woodruff, 2002; Dahan and Gaviria, 2001; Daude, 2011; Daude and Robano, 2015; Ferreira et al., 2013; Gaviria et al., 2007).[30] These results are confirmed by the influential work by Hertz et al. (2008), which compares intergenerational mobility trends across countries. Unsurprisingly, the only four Latin American countries included in the original Great Gatsby Curve by Miles Corak - Argentina, Brazil, Chile, and Peru - are situated in the upper right corner of the curve.

Figure 1b shows the mean relative educational position of children by their parents' position in the pooled sample of Latin American countries using Latinobarometro data. Here, two cohorts are compared that experienced very different levels of inequality in their childhood and adolescence: an older cohort (individuals born 1980 to 1987) and a younger cohort (individuals born 1988 to 1995). In the age interval from 11 to 18 years, when investment in human capital is essential, the first cohort experienced high levels of inequality in most Latin American countries, while the second substantially lower levels, and a declining trend. The slope drops from 0.255 to 0.248 indicating higher intergenerational mobility in the younger cohort.[31]

[30] A recent survey by Torche (2014) reviews the economic and sociological literature on intergenerational mobility in Latin America.

[31] The same analysis with the pooled sample of harmonized household survey data for eight countries yields a drop in the slope from 0.304 to 0.247. See Online Appendix.

Table 1: Intergenerational mobility in Latin America (Data: Latinobarometro, own estimates)

| | (1) Cohort 1980-1995 | | (2) 1980-1987 | | (3) 1988-1995 | |
|---|---|---|---|---|---|---|
| Argentina | 0.242*** | (0.0069) | 0.243*** | (0.0075) | 0.237*** | (0.0170) |
| Bolivia | 0.248*** | (0.0137) | 0.255*** | (0.0171) | 0.224*** | (0.0073) |
| Brazil | 0.254*** | (0.0082) | 0.257*** | (0.0094) | 0.244*** | (0.0179) |
| Chile | 0.374*** | (0.0196) | 0.382*** | (0.0212) | 0.346*** | (0.0470) |
| Colombia | 0.291*** | (0.0131) | 0.289*** | (0.0154) | 0.303*** | (0.0175) |
| Costa Rica | 0.267*** | (0.0145) | 0.287*** | (0.0143) | 0.204*** | (0.0140) |
| Dominican Rep. | 0.253*** | (0.0150) | 0.257*** | (0.0187) | 0.242*** | (0.0226) |
| Ecuador | 0.318*** | (0.0097) | 0.319*** | (0.0115) | 0.318*** | (0.0165) |
| El Salvador | 0.256*** | (0.0110) | 0.263*** | (0.0120) | 0.239*** | (0.0163) |
| Guatemala | 0.373*** | (0.0147) | 0.398*** | (0.0157) | 0.312*** | (0.0198) |
| Honduras | 0.358*** | (0.0201) | 0.334*** | (0.0204) | 0.441*** | (0.0115) |
| Mexico | 0.200*** | (0.0110) | 0.199*** | (0.0136) | 0.205*** | (0.0131) |
| Nicaragua | 0.294*** | (0.0118) | 0.280*** | (0.0110) | 0.340*** | (0.0218) |
| Panama | 0.328*** | (0.0120) | 0.323*** | (0.0120) | 0.348*** | (0.0365) |
| Paraguay | 0.234*** | (0.0228) | 0.289*** | (0.0154) | 0.128*** | (0.0385) |
| Peru | 0.286*** | (0.0071) | 0.281*** | (0.0060) | 0.305*** | (0.0237) |
| Uruguay | 0.329*** | (0.0086) | 0.338*** | (0.0087) | 0.310*** | (0.0233) |
| Venezuela | 0.199*** | (0.0127) | 0.212*** | (0.0123) | 0.141*** | (0.0241) |
| Demographic controls | Yes | | Yes | | Yes | |
| Country fixed effects | Yes | | Yes | | Yes | |
| Observations | 62729 | | 46849 | | 15880 | |
| $R^2$ | 0.226 | | 0.230 | | 0.227 | |

Outcome variables measured as relative distance from the mean by age, sex, country and cohort.

Data: Latinobarometro 1998-2013. Statistical significance level * 0.1 ** 0.05 *** 0.01.

Regression coefficients of own *vs.* parental relative educational position. Benchmark for Cohort 1980-1995: USA (PSID, own estimates) 0.158, Germany (SOEP v30, own estimates) 0.334

Although the different countries in Latin American have similar levels of inequality and intergenerational mobility if compared to developed countries – i.e. they would be situated in the same area of the graph performing a global analysis – significant differences can be registered between them. Table 1 shows the estimated regression coefficients of the baseline equation to measure intergenerational mobility, using the normalized measures for parents' and children's mean educational position as explained in Section 3.2. In the first column, the results are displayed for people born between 1980 and 1995, and then the period is subdivided in the older cohort and younger cohort as above; Figure A3 visualizes the results graphically and indicates the statistical significance of changes in estimates within countries.[32] The rates of intergenerational mobility for the two cohorts are displayed separately in columns two and three of Table 1. In a ranking of countries by their rates of intergenerational mobility, not all differences between countries are statistically significant, especially in the middle of the ranking. However, countries at the top of the ranking have significantly higher mobility than countries at the bottom (a pattern also found in earlier studies).[33] The range of the intergenerational mobility estimates varies from Venezuela and Mexico, where an increase of 10 percent in parental education relative to the mean of their reference group is associated to a 2 percent increase in the children's generation, to Chile and Guatemala, where it is associated to an increase of 3.7 percent.[34] Moreover, countries where one cohort experienced low (high) levels of mobility in comparison to the mean, also the subsequent cohort experiences low (high) intergenerational mobility, as highlighted in Figure A4.

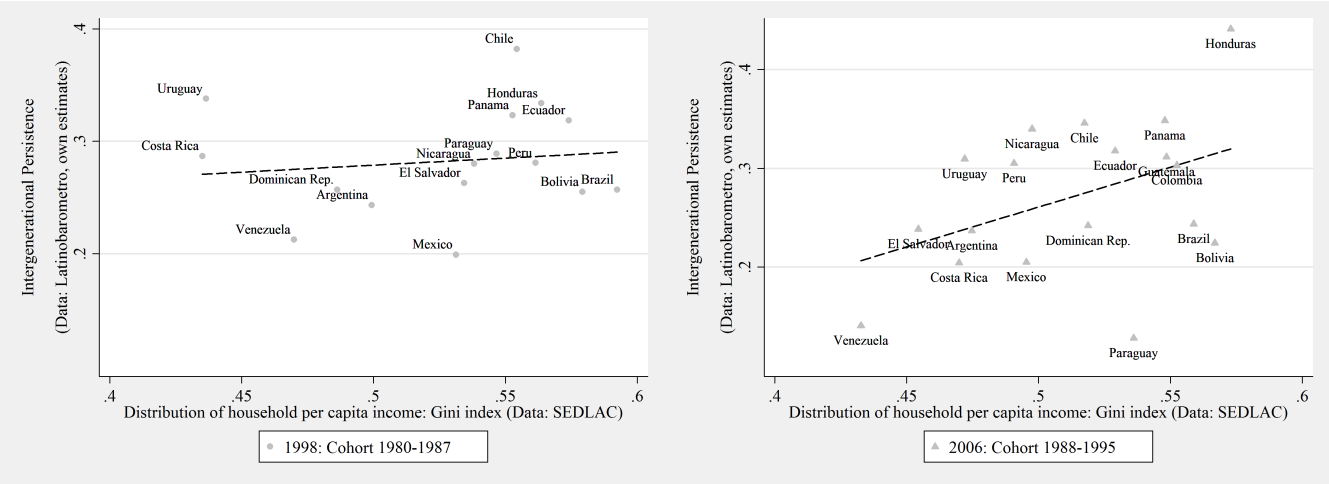
Since inequality has been declining in Latin America, the theoretical insights described in Section 2 suggest that younger cohorts should display higher levels of intergenerational mobility. Indeed, the mean level of intergenerational mobility is higher in the younger cohort, and, as shown in Figure A3, the estimated regression coefficients for the older cohort are greater than the ones for the younger cohort in 12 out of 18 countries. In contrast, in Mexico, Nicaragua, Peru, Colombia, Panama, and Honduras the younger cohort experienced lower intergenerational mobility than their older peers. However, these changes are sometimes very small in both directions and not in all cases statistically significant.[35] The next sections

[32] See Section 3 and especially Footnote 26 for further clarifications. Regression coefficients obtained without normalization, as well as the intergenerational correlation, and different age restrictions can be found in the Online Appendix.

[33] Figure A5 visualizes point estimates and confidence intervals graphically and ranks the countries by their degree of intergenerational mobility.

[34] As a benchmark, own estimates for the US (PSID data) and Germany (SOEP data) using the same restrictions (at least 18 years old and born between 1980 and 1995) and the applied linear transformation of completed years of education, yield regression coefficients of 0.158 and 0.334, respectively.

[35] Statistical significance is measured using the pooled sample of the 1980-1995 cohort for each country separately, and interacting the variable for parental educational position with a dummy signalizing the younger cohort. The changes in mobility are only in six countries significant at the 0.05 level, and in four at the 0.01 level (See Figure A3). However, the sample is relatively small in the younger cohort, varying from 660 observations in Panama to 1,448 in Nicaragua. Since only in Bolivia and Brazil the Latinobarometro sample includes individuals who are 16 and 17 years old, in the main analysis the sample is restricted to individuals who are at least 18 years old. The estimates change slightly, when different age restrictions are imposed, what however also sensibly reduces the samples. Nevertheless, as can be seen in the Online Appendix, the changes in estimates are not too serious. A comparison of estimates obtained from Latinobarometro data with ones obtained from the seven countries where the harmonized household survey data is available shows that the estimates are mainly consistent across countries, but differ sometimes regarding the two cohorts (See Online Appendix). The main reason for this should be the different composition of the sample between Latinobarometro and the harmonized household survey




(a) The Great Gatsby Curve - Older cohort

(b) The Great Gatsby Curve - Younger cohort

Figure 2: Inequality and Intergenerational Mobility in Latin America - The Great Gatsby Curve I

will therefore focus on the relationship between changes in inequality and changes in intergenerational mobility. First, in a stylized analysis in Section 4.2, and then, in a more detailed microeconometric framework in Section 4.3.[36]

### 4.2 Stylized Facts on Latin America's Great Gatsby Curve

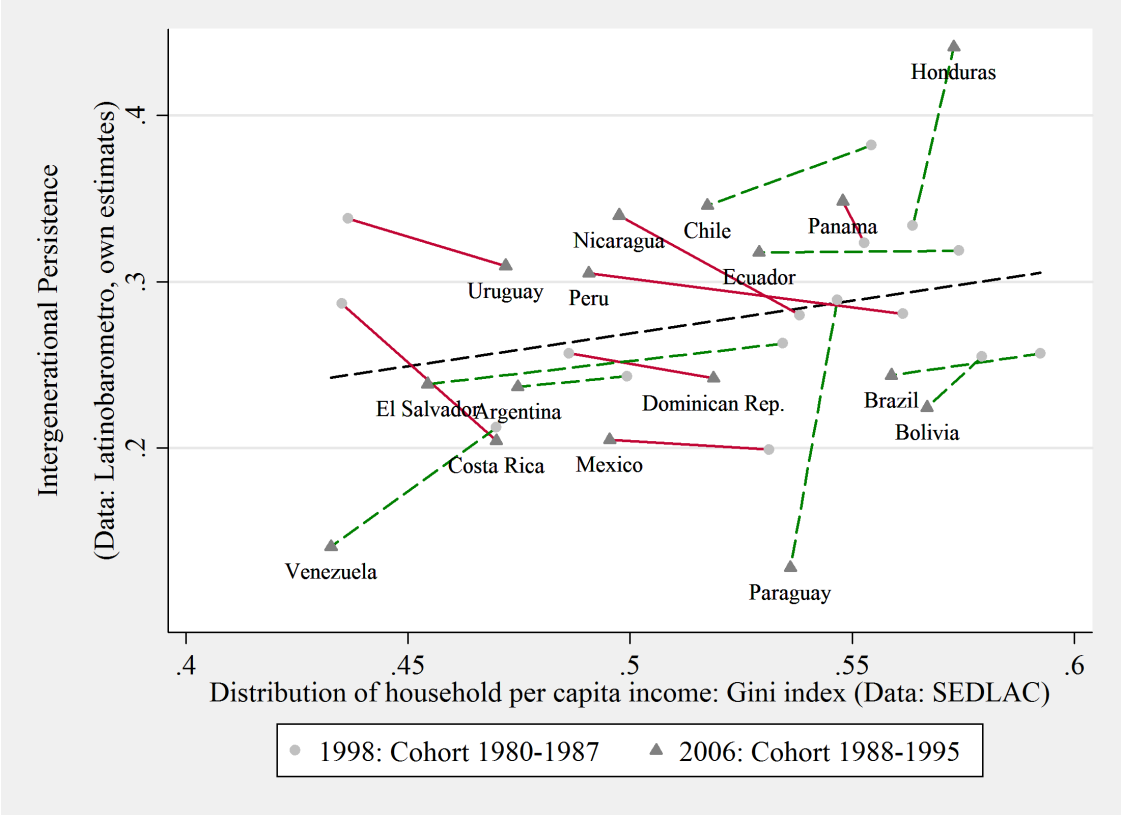
With the results of the regression analysis displayed in Table 1 and the Gini coefficients of disposable household per capita income in two benchmark years 1998 and 2006, the Great Gatsby Curve for Latin America can be constructed, and displacements along the curve from one period to the next can be observed.[37] The corresponding cohorts for which intergenerational mobility is measured are 1980-1987 and 1988-1995, respectively, i.e. composed of adult respondents who were 11 to 18 years old in one of the two benchmark years.[38] In this part of the analysis, Colombia and Guatemala are excluded, because information on inequality in SEDLAC data for these countries start in 2001 and 2000 respectively. Figure 2 shows the cross country relationship in both periods, while Figure 3 shows the displacements within countries along the Great Gatsby curve. The expected positive relationship between intergenerational persistence and inequality can be observed in both periods and in the joint analysis. Intergenerational

data as stated above, especially in the younger cohort (See Tables A1 to A4 for descriptive statistics).

[36] An alternative measurement of intergenerational mobility, called Social Mobility Index (SMI) and proposed by Andersen (2003), is included in the SEDLAC data for each year and country in which survey data is available. This index, as well as its strength and limitations, are discussed in the Online Appendix. Since the limitations for an analysis of intergenerational mobility probably outweigh the advantages, in the present study own measurements of intergenerational mobility are estimated. In the Online Appendix, the SMI-1 and SMI-2 are reported for the sake of completeness, and generally confirm the pattern of rising social intergenerational mobility in most Latin American countries. A comparison of the SMI with the intergenerational mobility measure estimated in the present study can be also found in the Online Appendix.

[37] As a robustness check, inequality has been also averaged from 1997 to 1999 and from 2005 to 2007 to measure the two benchmark years, with no variation in the results.

[38] See Section 3.1 for clarifications on the age interval.




(a) Displacements along the Great Gatsby Curve


(b) Relative changes in inequality and mobility

Figure 3: Inequality and Intergenerational Mobility in Latin America - The Great Gatsby Curve II

mobility estimates across countries are in a closer range for the older cohort, ranging from about 0.2 to 0.4, and more dispersed in the younger cohort, with a range from about 0.1 to 0.45. Inequality levels seem to be much more diverse across countries in both benchmark years, a pattern which has already been highlighted in earlier research (Gasparini et al., 2011).

As for the within country relationship between inequality and intergenerational mobility, 9 countries follow the expected displacements along the Great Gatsby Curve, as in the theoretically hypothesized *ceteris paribus* framework: Argentina, Bolivia, Brazil, Chile, Ecuador, El Salvador, Honduras, Paraguay, and Venezuela. In Mexico, Nicaragua, Panama and Peru, the younger cohort shows lower mobility rates than their older peers, although at times were parental investment in their human capital was essential, incomes were more equally distributed. Opposite patterns are observed for the Dominican Republic, Costa Rica and Uruguay, where mobility increased despite of higher income inequality faced by the parental generation.

This stylized analysis gives a first intuitive overview of the problem, but certainly not a solution. We see that the majority of countries follow the expected relationship over time, confirming the cross-country findings of the Great Gatsby Curve. But at the same time, some countries "behave" differently. Furthermore, as stated in the previous section, changes in mobility between the two cohorts are only statistically significant in the case of five countries for which we have data on inequality: Honduras, Paraguay and Venezuela, confirming the negative relationship, and Costa Rica and Nicaragua, rejecting it. All together, these first findings seem to give some further reason for not rejecting the hypothesis that cross-country heterogeneity is likely to be the main force behind the observed differences in inequality and intergenerational mobility as some authors point out (e.g. Acemoglu and Robinson, 2012; Ichino et al., 2011). Also, it might be argued that budget constrains limiting parental investment in human capital are only of low importance, since high inequality and high mobility seem to coexist. However, all interpretations at this point have to be taken very cautiously since the possible effect of particular differences between countries does not allow to verify the hypothesis in detail. The analysis in the following sections will therefore analyze the effect of inequality on intergenerational mobility adopting a different approach that allows to control for cross-country heterogeneity.

### 4.3 Microeconometric Analysis

In the previous section, the analysis was merely descriptive and restricted to a stylized analysis at the meta level. Now, a more detailed microeconometric set up is adopted which allows to test the hypothesis of a negative relationship between inequality and intergenerational mobility.[39] The methodology applied here and the underlying equations are described in detail in Section 3.2. Table 2 and Table 3 show the main results with Latinobarometro and the harmonized household survey data, respectively. The results are classified by the relevant lifetime period when inequality, growth, and public expenditures in education

[39] In a parallel project (Gasparini, Neidhöfer and Serrano, *forthcoming*), a novel cross country data set on intergenerational mobility trends is introduced over a span of over 50 years, which allows to analyze the relationship between intergenerational mobility and inequality - or other features - in a macroeconometric set up.

Table 2: Microeconometric Analysis - Latinobarometro

| | A-(1) | A-(2) | A-(3) | A-(4) | B-(1) | B-(2) | B-(3) | B-(4) | C-(1) | C-(2) | C-(3) | C-(4) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parental Education | 0.256*** | 0.256*** | 0.257*** | 0.243*** | 0.254*** | 0.254*** | 0.252*** | 0.250*** | 0.257*** | 0.257*** | 0.253*** | 0.248*** |
| | (0.0073) | (0.0073) | (0.0069) | (0.0099) | (0.0044) | (0.0044) | (0.0039) | (0.0048) | (0.0040) | (0.0040) | (0.0036) | (0.0033) |
| Parental Education*$\overline{Gini}(0 \leq age \leq 6)$ | 0.192*** | 0.192*** | 0.142** | 0.363** | | | | | | | | |
| | (0.0667) | (0.0667) | (0.0719) | (0.1639) | | | | | | | | |
| Parental Education*$\overline{GDPp.c.}(0 \leq age \leq 6)$ | | | -0.014*** | -0.013* | | | | | | | | |
| | | | (0.0039) | (0.0072) | | | | | | | | |
| Parental Education*$\overline{Startingage}(0 \leq age \leq 6)$ | | | | -0.000 | | | | | | | | |
| | | | | (0.0113) | | | | | | | | |
| Parental Education*$\overline{Gini}(6 \leq age \leq 12)$ | | | | | 0.130** | 0.130** | 0.048 | 0.107 | | | | |
| | | | | | (0.0651) | (0.0651) | (0.0609) | (0.0745) | | | | |
| Parental Education*$\overline{GDPp.c.}(6 \leq age \leq 12)$ | | | | | | | -0.010*** | -0.010*** | | | | |
| | | | | | | | (0.0022) | (0.0026) | | | | |
| Parental Education*$\overline{Pub.Educ}(6 \leq age \leq 12)$ | | | | | | | | -0.009** | | | | |
| | | | | | | | | (0.0039) | | | | |
| Parental Education*$\overline{Gini}(12 \leq age \leq 18)$ | | | | | | | | | 0.221*** | 0.221*** | 0.101 | 0.109 |
| | | | | | | | | | (0.0701) | (0.0701) | (0.0637) | (0.0673) |
| Parental Education*$\overline{GDPp.c.}(12 \leq age \leq 18)$ | | | | | | | | | | | -0.009*** | -0.006*** |
| | | | | | | | | | | | (0.0017) | (0.0018) |
| Parental Education*$\overline{Pub.Educ}(12 \leq age \leq 18)$ | | | | | | | | | | | | -0.014*** |
| | | | | | | | | | | | | (0.0030) |
| $\overline{Gini}(0 \leq age \leq 6)$ | 0.002 | -0.021 | 0.006 | 0.006 | | | | | | | | |
| | (0.0046) | (0.0265) | (0.0220) | (0.0264) | | | | | | | | |
| $\overline{GDPp.c.}(0 \leq age \leq 6)$ | | | 0.002 | 0.001 | | | | | | | | |
| | | | (0.0015) | (0.0013) | | | | | | | | |
| $\overline{Startingage}(0 \leq age \leq 6)$ | | | | ◦ | | | | | | | | |
| $\overline{Gini}(6 \leq age \leq 12)$ | | | | | -0.000 | 0.009 | -0.003 | 0.054* | | | | |
| | | | | | (0.0061) | (0.0179) | (0.0196) | (0.0278) | | | | |
| $\overline{GDPp.c.}(6 \leq age \leq 12)$ | | | | | | | -0.002* | 0.000 | | | | |
| | | | | | | | (0.0009) | (0.0009) | | | | |
| $\overline{Pub.Educ}(6 \leq age \leq 12)$ | | | | | | | | -0.001*** | | | | |
| | | | | | | | | (0.0005) | | | | |
| $\overline{Gini}(12 \leq age \leq 18)$ | | | | | | | | | 0.010 | 0.020 | 0.033 | 0.025 |
| | | | | | | | | | (0.0078) | (0.0199) | (0.0206) | (0.0201) |
| $\overline{GDPp.c.}(12 \leq age \leq 18)$ | | | | | | | | | | | 0.004*** | 0.003*** |
| | | | | | | | | | | | (0.0009) | (0.0008) |
| $\overline{Pub.Educ}(12 \leq age \leq 18)$ | | | | | | | | | | | | 0.002*** |
| | | | | | | | | | | | | (0.0005) |
| Demographic controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country fixed effects | No | Yes | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Observations | 33007 | 33007 | 33007 | 15777 | 62911 | 62911 | 62911 | 53912 | 87937 | 87937 | 87907 | 78845 |
| $R^2$ | 0.193 | 0.193 | 0.194 | 0.192 | 0.185 | 0.185 | 0.185 | 0.179 | 0.189 | 0.189 | 0.189 | 0.181 |
| N_clust | 193 | 193 | 193 | 138 | 290 | 290 | 290 | 255 | 365 | 365 | 364 | 329 |

Data: Latinobarometro 1998-2013. ◦) dropped because of multicollinearity.
Cluster adjusted s.e. by country and birthyear. Statistical significance level * 0.1 ** 0.05 *** 0.01.

Table 3: Microeconometric Analysis - Harmonized Household Surveys

| | A-(1) | A-(2) | A-(3) | A-(4) | B-(1) | B-(2) | B-(3) | B-(4) | C-(1) | C-(2) | C-(3) | C-(4) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parental Education | 0.240*** | 0.241*** | 0.274*** | 0.204*** | 0.253*** | 0.253*** | 0.259*** | 0.259*** | 0.271*** | 0.271*** | 0.271*** | 0.272*** |
| | (0.0063) | (0.0064) | (0.0108) | (0.0223) | (0.0059) | (0.0059) | (0.0070) | (0.0080) | (0.0061) | (0.0061) | (0.0056) | (0.0042) |
| Parental Education*$\overline{Gini}(0 \leq age \leq 6)$ | 1.217*** | 1.251*** | 0.246 | -1.189 | | | | | | | | |
| | (0.2699) | (0.2725) | (0.4435) | (1.6530) | | | | | | | | |
| Parental Education*$\overline{GDPp.c.}(0 \leq age \leq 6)$ | | | -0.027*** | -0.016* | | | | | | | | |
| | | | (0.0072) | (0.0082) | | | | | | | | |
| Parental Education*$\overline{Startingage}(0 \leq age \leq 6)$ | | | | 0.027 | | | | | | | | |
| | | | | (0.0255) | | | | | | | | |
| Parental Education*$\overline{Gini}(6 \leq age \leq 12)$ | | | | | 0.826*** | 0.877*** | 0.734*** | 0.833** | | | | |
| | | | | | (0.2157) | (0.2124) | (0.2140) | (0.4030) | | | | |
| Parental Education*$\overline{GDPp.c.}(6 \leq age \leq 12)$ | | | | | | | -0.010*** | -0.010*** | | | | |
| | | | | | | | (0.0033) | (0.0035) | | | | |
| Parental Education*$\overline{Pub.Educ}(6 \leq age \leq 12)$ | | | | | | | | -0.016* | | | | |
| | | | | | | | | (0.0090) | | | | |
| Parental Education*$\overline{Gini}(12 \leq age \leq 18)$ | | | | | | | | | 0.832*** | 0.873*** | 0.797*** | 1.681*** |
| | | | | | | | | | (0.2708) | (0.2619) | (0.2215) | (0.2491) |
| Parental Education*$\overline{GDPp.c.}(12 \leq age \leq 18)$ | | | | | | | | | | | -0.014*** | -0.008*** |
| | | | | | | | | | | | (0.0028) | (0.0018) |
| Parental Education*$\overline{Pub.Educ}(12 \leq age \leq 18)$ | | | | | | | | | | | | -0.030*** |
| | | | | | | | | | | | | (0.0064) |
| $\overline{Gini}(0 \leq age \leq 6)$ | 0.269*** | 0.938** | -1.005 | 0.046 | | | | | | | | |
| | (0.0886) | (0.4147) | (0.6189) | (0.1298) | | | | | | | | |
| $\overline{GDPp.c.}(0 \leq age \leq 6)$ | | | -0.037** | 0.004 | | | | | | | | |
| | | | (0.0148) | (0.0022) | | | | | | | | |
| $\overline{Startingage}(0 \leq age \leq 6)$ | | | | ◦ | | | | | | | | |
| $\overline{Gini}(6 \leq age \leq 12)$ | | | | | 0.138 | 0.600*** | 0.350** | -0.064 | | | | |
| | | | | | (0.1045) | (0.2204) | (0.1747) | (0.0834) | | | | |
| $\overline{GDPp.c.}(6 \leq age \leq 12)$ | | | | | | | -0.007** | 0.002 | | | | |
| | | | | | | | (0.0030) | (0.0023) | | | | |
| $\overline{Pub.Educ}(6 \leq age \leq 12)$ | | | | | | | | -0.004*** | | | | |
| | | | | | | | | (0.0016) | | | | |
| $\overline{Gini}(12 \leq age \leq 18)$ | | | | | | | | | 0.040 | -0.095 | -0.089 | 0.016 |
| | | | | | | | | | (0.0862) | (0.0675) | (0.0668) | (0.0747) |
| $\overline{GDPp.c.}(12 \leq age \leq 18)$ | | | | | | | | | | | 0.001 | 0.007*** |
| | | | | | | | | | | | (0.0029) | (0.0024) |
| $\overline{Pub.Educ}(12 \leq age \leq 18)$ | | | | | | | | | | | | -0.005** |
| | | | | | | | | | | | | (0.0019) |
| Demographic controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country fixed effects | No | Yes | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Observations | 63843 | 63843 | 63843 | 22362 | 139610 | 139610 | 139610 | 130915 | 203787 | 203787 | 203787 | 195320 |
| $R^2$ | 0.207 | 0.208 | 0.209 | 0.150 | 0.225 | 0.225 | 0.226 | 0.225 | 0.240 | 0.241 | 0.242 | 0.241 |
| N_clust | 54 | 54 | 54 | 28 | 97 | 97 | 97 | 85 | 134 | 134 | 134 | 128 |

Data: Harmonized household surveys. ◦) dropped because of multicollinearity.
Cluster adjusted s.e. by country and birthyear. Statistical significance level * 0.1 ** 0.05 *** 0.01.

are measured: (A) *Early childhood*, (B) *Primary school age,* and (C) *Adolescence*. Each specification comprises four estimations displayed in separate columns and indicating the number of the equations as defined in Section 3.2.

The first rows in Table 2 and Table 3 show the intergenerational mobility parameter $\beta$ at the mean of all the interacted variables with parental educational position, i.e. inequality, growth and public investment in human capital. The coefficients that display the interaction effect between parental educational position and the characteristics of interest can be found in the rows two to nine. Basically, what is observed is that there are different slopes in the conditional correlation of parents' and children's educational position related to the macro-level characteristics. Estimating equation (1) using both data sets gives that inequality, measured by the Gini of household per capita income, significantly changes the slope in all three specifications, with only slight changes when country fixed effects are included as in equation (2).[40] This is a strong evidence for a negative relationship between inequality and intergenerational mobility, which goes beyond cross country heterogeneity. Also, it might indicate an important role of credit constrains limiting parental investment in children's human capital in Latin America, since one of the main reasons for the decline in inequality in the region has been the provision of cash transfer programs to poor families and generally more exhaustive social spending (Gasparini and Lustig, 2011). Besides, it gives also contrasting evidence to the hypothesis of higher intergenerational mobility caused by higher returns to human capital investment, since the increase in inequality in Latin America was driven by a downfall in the skill premium, too. These two possible interpretations of the findings should be addressed more in detail in future research.

In economic theory, growth has been theorized to increase intergenerational mobility and, furthermore, to drive income inequality (among others, Galor and Tsiddon, 1997; Galor and Moav, 2004; Hassler and Mora, 2000). On the other hand, many authors highlighted the key role of public investment in human capital (among others Benabou, 1996; Davies et al., 2005; Solon, 2002) and empirically confirmed a positive association with intergenerational mobility (e.g. Mayer and Lopoo, 2008). To test these hypotheses, the two features are included in the analysis. Including growth as in equation (3), measured by GDP per capita, the interaction effect of inequality with parental background is still positive, but not significant in all specifications. The same pattern arises when public expenditure in education, measured as percentage of GDP, is interacted with parental education as in equation (4).[41] This highlights one important channel which might be the main driver of the relationship, on the one hand, and confirm the power of public investment in human capital to outweigh the lack of private investment, on the other. Indeed, the coefficients of economic growth and public expenditures in education have the expected negative sign, showing an enhancing effect on intergenerational mobility. The former might be related to the

[40] It is not surprising that including country fixed effects does not change the coefficients significantly, since the outcome variables for parents and children has been normalized at the country level. In a robustness check keeping simply years of completed schooling as outcome variables without any normalization, the coefficients indeed vary, but are still positive and significant in all specifications, what confirms the negative relationship between inequality and intergenerational mobility, controlling for cross-country heterogeneity.

[41] Performing the analysis with public expenditure per pupil as percentage of GDP per capita do not change the results significantly.

strong decrease in poverty in Latin America of the last decades.[42] Since growth has been mainly pro-poor in Latin America, allowing a substantial middle class to rise and hence lowering income inequality (Ferreira et al., 2013), it gives further evidence for the important role of credit constraints. The positive effect of public educational expenditures confirms latest findings, among others, by Aizer (2014); Jerrim and Macmillan (2015); Herrington (2015); Holter (2015) on the importance of public investment in human capital for intergenerational mobility, and equality of opportunity. The starting age of compulsory education seems to have no effect on mobility as can be seen in column A-(4) of Table 2 and Table 3.[43]

These results are robust to different specifications: First, in the main analysis using the harmonized household survey data, all the available information on educational attainment of parents and children is used to compute the relative educational position. A robustness check with the same specification as in Latinobarometro data yields the same patterns. Second, if restricting the analysis with Latinobarometro data to the countries for which household survey data is available, results are very similar in specification (A) and (B), and differ slightly in (C).[44] Third, another important issue working with household survey data is weighting. Since the underlying sample is derived pooling data from different waves of the survey in one case and different waves and countries in the other, results obtained without using sampling weights should be the more appropriate ones. Anyway, results obtained using weights do not differ significantly.[45] Fourth, as further robustness check, the estimations are performed both without normalizing years of education of parents and children, and normalizing by the Z-Score of own and parental education. Using these measures, the evidence is still more striking showing a negative effect of inequality on intergenerational mobility. Last, different age restrictions imposed to the sample – the main analysis is restricted to individuals who are at least 18 years old – yield very similar results.[46]

Since inequality, growth, and public expenditures in education on the one hand, and parental education on the other are continuous variables, the coefficient tells us the direction, but not the magnitude of the relationship. For this purpose, the next section will show the marginal effect at certain values of the three characteristics to identify the determinant forces of intergenerational mobility.

### 4.4 Determinants of Intergenerational Mobility

The main results of the analysis until now, are that inequality is negatively associated with intergenerational mobility while the effect of economic growth and public expenditures in education is positive. Furthermore, this effects turn out to be statistically significant. Now, the question is how economically significant these results are and how to interpret them. Since both parental education and the macro-level

[42] The fraction of people in Latin America living under the poverty line, fell from about 28 to 13 percent from the middle of the 90ties to 2011 (Levy and Schady, 2013).

[43] As can be seen in Figure A2, the starting age of compulsory education also lacks in within country variation.

[44] Performing this robustness check, the only estimation which does not confirm the results of the main analysis is obtained in specification (C) when including economic growth in the regression. Here, the interaction effect of inequality on parental educational position turns negative significant (at 0.05 level). A sensitivity analysis shows that this result is driven by Guatemala, which in fact has the more dispersed distribution of educational attainments in both samples.

[45] For a recent overview on sampling weights, see Solon et al. (2015).

[46] These and other robustness checks can be found in the Online Appendix.

variables – inequality ($Q$, measured by the Gini coefficient), growth ($G$, measured by GDP per capita), and public investment in human capital ($Z$, measured by public expenditures in education as percentage of GDP) – are continuous, the coefficient of parental education measures the mean effect of those variables at value 0 which is by construction the sample mean. To measure the magnitude of the effect at certain values of $Q$, $G$ and $Z$ on intergenerational mobility, the following equation is estimated on the three specifications mentioned above:

$$y_{ic} = \alpha + \beta y_{ic}^{p} + \delta X_{ic} + \gamma \cdot y_{ic}^{p} \cdot \Omega_c + \tau \Omega_c + \lambda \Phi_c + \vartheta_c + \varepsilon_{ic}, \tag{5}$$

where $\Omega \epsilon \{Q, G, Z\}$ and $\Phi$ are country specific control variables. The remaining variables in the equation are defined as in section 3.2. Then, the marginal effects are computed: $\frac{\partial y_{ic}}{\partial y_{ic}^{p}} = \beta + \gamma \Omega_c$. The magnitude of the effects define the determinant factors of intergenerational mobility measured at different levels of inequality, growth, and public investment in human capital (displayed in Figure A7).[47]

The points in Figure A7 show the marginal effects of the interaction with parental educational background measured at different levels of inequality, economic growth, and public investment in human capital. The estimations control for country fixed effects and additionally for GDP and GDP per capita when the effect of public expenditures in education is measured. A statistically significant effect at economically plausible levels of inequality, growth, and public expenditure in education is found in all three specifications, (A) Early childhood, (B) Primary school age, and (C) Adolescence. As for the magnitude of the effect, intergenerational mobility - i.e. the gradient of parental educational background - varies significantly at relatively sharp shifts in inequality and growth and at moderate changes in public expenditure in education.

When the Gini coefficient changes by 0.15, intergenerational mobility varies from 9 to 12 percent depending on the specification of the lifetime period of evaluation. The sharpest change in the slope can be observed when measuring inequality in early childhood (specification A), a statistically significant change is observed when measuring inequality in adolescence (specification C). A change in inequality of similar magnitude has actually been experienced by Bolivia and Ecuador where inequality fell from a Gini coefficient of about 0.6 at the end of the nineties to 0.45 in the late 2000s. In the other countries where inequality has been falling, the change was within a range of 0.02 to 0.1 Gini points in this period.[48]

Changes in economic growth affect intergenerational mobility significantly between 5 and 8 percent of the gradient when GDP per capita changes by 2000 USD. The most remarkable change in the slope is observed, again, measuring growth in early childhood. In the case of economic growth measured by GDP per capita, the interpretation is more complex because of some contrasting facts. On the one hand, an increase of 2000 USD in GDP per capita is mostly a long run process for a developing country and actually never occurred in some Latin American countries like Bolivia, Guatemala, Honduras, and Nicaragua since 1970 until now. For some countries, like Brazil and Colombia, it has been a process

[47] The full table displaying all marginal effects can be found in the Online Appendix.

[48] Inequality trends in Latin America obtained from SEDLAC data are displayed in Figure 1a.

lasting 30 and 40 years, while in others like Chile, Costa Rica, and Panama, GDP per capita rose by 2000 USD or more within a decade.[49] On the other hand, since year of birth varies in the sample from 1970 to 1995, the time horizon comprises 25 years which might be enough for such a development to take place. Furthermore, GDP per capita is arguably the right measure to compare economic growth between different countries over time, but information on within country characteristics like well-being is probably not caught up. For instance, the cost of education might be an important factor, too, as well as consumption levels. Moreover, the dynamics of technological progress should be investigated more in detail. The results of this study point at an overall significant influence of economic growth on intergenerational mobility, but future research should focus on the questions above to allow a more precise interpretation. As a last remark, the relatively higher importance of economic growth (and inequality) experienced in early childhood seems to confirm that investment in human capital is especially important in early periods of lifetime.

The most important factor besides private investment in children's human capital has been theorized to be public investment through the provision of access to education. In the present study, public investment in human capital is measured by public expenditure in education as percentage of GDP.[50] Holding GDP and GDP per capita constant, a change of public expenditures in education by two percentage points significantly changes intergenerational mobility estimates by 7 to 9 percent.[51] At the relatively low levels of public expenditures in education in Latin America, an increase by two percentage points can be a duplication of the efforts in absolute terms; for example, in Ecuador, Nicaragua, and Uruguay public expenditures in education were around two percent of GDP in early 2000s. Nevertheless, most countries indeed experienced such a change, especially in the period from 2000 to 2010.[52] Public investment in human capital is confirmed, thus, as an important channel to replace private investment and, therefore, to increase intergenerational mobility.

## 5 Conclusions

In this study, the relationship between income inequality and intergenerational mobility has been tested using two different sets of harmonized household survey data for 18 Latin American countries. The presence of a negative relationship – as hypothesized by economic theory and evidenced by cross country evaluations in past – has been confirmed, controlling for cross country heterogeneity and other institutional characteristics. Further, economic growth showed to be one of the main channels behind the relationship in Latin America, while public expenditures in education is an important contrasting force. Since the two sets of micro data include the same countries but derive from completely different sources

[49] See Figure A6a for GDP per capita trends in Latin America obtained from World Bank data.

[50] And also, by the starting age of compulsory education, which however shows to have no significant effect on intergenerational mobility and is therefore not further evaluated in this part of the analysis.

[51] The results do not change significantly if including the duration of compulsory education as further control variable in the estimations.

[52] See Figure A6b for public expenditure in education trends in Latin America obtained from World Bank data.

– one from official public institutions and the other from non-governmental sources – obtaining the same patterns with both is a strong evidence for the robustness of these results. It can, therefore, be concluded that (private and public) investment in human capital is determinant for intergenerational mobility, and a strongly dispersed distribution of this feature seriously challenges equality of opportunity in a society.

The findings of this study fill the gap on multi-country and multi-period evidence on the relationship between inequality and intergenerational mobility, confirming for the first time that the *Great Gatsby Curve* exists also within multiple countries over time. Furthermore, ample space for further research on the subject is left open. For example, the role of economic growth and development might be evaluated differently, like through technological progress, poverty reduction, or the strength of institutions. Also, the multiple dimensions of public investment in human capital should be analyzed more in detail. An especially interesting question is, for example, if spending in primary, secondary and tertiary education have diverging effects on intergenerational mobility. Further insights might arise analyzing different forms of redistributive policies, taxation, health care etc.

Another important aspect, which has been touched only marginally in the present study, is the effect of returns to human capital. Increasing returns to human capital has been theorized in past to cause higher intergenerational mobility. However, the ascending trend in mobility associated with declining income inequality found in this study do not confirm this hypothesis, especially since the inequality reduction in Latin America has been argued to be in part due to a downfall in the skill premium (e.g. Gasparini and Lustig, 2011). At the same time, although school enrollment and attendance (as well as health outcomes) increased especially among the poor in consequence of the wide spread social programs in Latin America, educational systems still lag behind in quality, and the evidence on the long run effectiveness on human capital is still mixed (e.g. Cruces et al., 2014; Levy and Schady, 2013). Future research should thus address this points more in detail with a more profound analysis – in a similar set up – on the significance of returns to human capital to affect intergenerational mobility.

In conclusion, this is one of very few studies analyzing the relationship between inequality and intergenerational mobility in developing countries. The implications should be applicable to developed countries as well, if no other differing mechanisms play a fundamental role. It is left for future research to empirically verify this last question.

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# A Additional Tables & Figures

Table A1: Latinobarómetro; Databases 1998, 2000-2011, 2013.

| Country | Year of birth | (sd) | (min) | (max) | Age | (sd) | (min) | (max) | Male | (sd) | (min) | (max) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 1980 | 5.97 | 1970 | 1995 | 26.26 | 5.92 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Bolivia | 1980 | 6.20 | 1970 | 1995 | 26.11 | 6.10 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Brazil | 1980 | 6.08 | 1970 | 1995 | 26.64 | 6.16 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Chile | 1979 | 6.20 | 1970 | 1995 | 26.75 | 6.18 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Colombia | 1980 | 6.09 | 1970 | 1995 | 26.45 | 6.04 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Costa Rica | 1980 | 6.16 | 1970 | 1995 | 26.31 | 6.12 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Dominican Rep. | 1981 | 6.33 | 1970 | 1995 | 27.02 | 6.32 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Ecuador | 1980 | 6.20 | 1970 | 1995 | 26.30 | 6.00 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| El Salvador | 1980 | 5.97 | 1970 | 1995 | 26.04 | 5.75 | 18 | 43 | 0.48 | 0.50 | 0 | 1 |
| Guatemala | 1980 | 6.16 | 1970 | 1995 | 25.83 | 5.90 | 18 | 43 | 0.48 | 0.50 | 0 | 1 |
| Honduras | 1980 | 6.12 | 1970 | 1995 | 25.85 | 5.88 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Mexico | 1979 | 6.02 | 1970 | 1995 | 26.67 | 6.03 | 18 | 43 | 0.47 | 0.50 | 0 | 1 |
| Nicaragua | 1980 | 6.00 | 1970 | 1995 | 25.74 | 5.79 | 18 | 43 | 0.48 | 0.50 | 0 | 1 |
| Panama | 1980 | 6.20 | 1970 | 1995 | 26.58 | 6.10 | 18 | 43 | 0.48 | 0.50 | 0 | 1 |
| Paraguay | 1981 | 6.40 | 1970 | 1995 | 26.48 | 6.33 | 18 | 43 | 0.50 | 0.50 | 0 | 1 |
| Peru | 1980 | 6.20 | 1970 | 1995 | 26.33 | 6.10 | 18 | 43 | 0.49 | 0.50 | 0 | 1 |
| Uruguay | 1980 | 6.22 | 1970 | 1995 | 26.76 | 6.11 | 18 | 43 | 0.50 | 0.50 | 0 | 1 |
| Venezuela | 1980 | 6.02 | 1970 | 1995 | 26.28 | 5.93 | 18 | 43 | 0.50 | 0.50 | 0 | 1 |

Weighted Sample Statistics: Means and Standard Deviations by Country.

Table A2: Harmonized Household Surveys

| Country | Year of birth | (sd) | (min) | (max) | Age | (sd) | (min) | (max) | Male | (sd) | (min) | (max) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brazil | 1976 | 5.17 | 1970 | 1990 | 27.75 | 5.67 | 18 | 38 | 0.42 | 0.49 | 0 | 1 |
| Chile | 1979 | 6.22 | 1970 | 1995 | 31.04 | 6.23 | 18 | 43 | 0.36 | 0.48 | 0 | 1 |
| Colombia | 1981 | 6.73 | 1970 | 1995 | 29.38 | 6.73 | 18 | 43 | 0.46 | 0.50 | 0 | 1 |
| Ecuador | 1976 | 4.90 | 1970 | 1988 | 24.89 | 4.96 | 18 | 36 | 0.45 | 0.50 | 0 | 1 |
| Guatemala | 1980 | 6.15 | 1970 | 1993 | 27.61 | 6.05 | 18 | 41 | 0.43 | 0.49 | 0 | 1 |
| Mexico | 1978 | 5.94 | 1970 | 1991 | 28.67 | 6.16 | 18 | 39 | 0.42 | 0.49 | 0 | 1 |
| Nicaragua | 1975 | 3.17 | 1970 | 1980 | 22.95 | 3.17 | 18 | 28 | 0.44 | 0.50 | 0 | 1 |
| Panama | 1978 | 5.46 | 1970 | 1990 | 26.75 | 5.54 | 18 | 38 | 0.46 | 0.50 | 0 | 1 |
| Peru | 1976 | 4.98 | 1970 | 1995 | 31.35 | 5.57 | 18 | 43 | 0.78 | 0.41 | 0 | 1 |

Weighted Sample Statistics: Means and Standard Deviations by Country. Brazil: PNAD 1982, 1988, 1996; PDSD 2008. Chile: CASEN 2006, 2009, 2011, 2013. Colombia: ECV 2003, 2008, 2010-2013. Ecuador: ECV 1994, 1995, 1998, 2006. Guatemala: ENCOVI 2000, 2006, 2011. Mexico: MXFLS 2002, 2005, 2006, 2009-2012. Nicaragua: EMNV 1998. Panama: ENV 1997, 2003, 2009. Peru: ENAHO 2001-2012.

Table A3: Latinobarómetro; Databases 1998, 2000-2011, 2013.

| Country | Years of education | (sd) | (min) | (max) | Y. of parental education | (sd) | (min) | (max) | N |
|---|---|---|---|---|---|---|---|---|---|
| Argentina | 11.05 | 2.62 | 0 | 15 | 9.00 | 3.67 | 0 | 15 | 6634 |
| Bolivia | 9.62 | 4.10 | 0 | 15 | 6.13 | 5.39 | 0 | 15 | 7881 |
| Brazil | 8.79 | 3.69 | 0 | 15 | 5.81 | 4.36 | 0 | 15 | 6822 |
| Chile | 10.70 | 3.06 | 0 | 15 | 8.99 | 4.04 | 0 | 15 | 5986 |
| Colombia | 9.84 | 3.96 | 0 | 15 | 7.05 | 4.86 | 0 | 15 | 7461 |
| Costa Rica | 8.67 | 3.58 | 0 | 15 | 7.03 | 4.43 | 0 | 15 | 6030 |
| Dominican Rep. | 9.18 | 4.05 | 0 | 15 | 6.66 | 5.06 | 0 | 15 | 3926 |
| Ecuador | 9.71 | 3.74 | 0 | 15 | 6.93 | 4.47 | 0 | 15 | 7843 |
| El Salvador | 8.17 | 4.41 | 0 | 15 | 4.79 | 5.02 | 0 | 15 | 6635 |
| Guatemala | 6.19 | 4.68 | 0 | 15 | 4.28 | 4.68 | 0 | 15 | 6757 |
| Honduras | 6.33 | 4.31 | 0 | 15 | 4.11 | 4.39 | 0 | 15 | 6953 |
| Mexico | 9.39 | 3.69 | 0 | 15 | 7.02 | 4.70 | 0 | 15 | 8035 |
| Nicaragua | 7.46 | 4.44 | 0 | 15 | 5.28 | 5.26 | 0 | 15 | 6540 |
| Panama | 9.82 | 3.98 | 0 | 15 | 7.40 | 4.91 | 0 | 15 | 5634 |
| Paraguay | 9.31 | 3.46 | 0 | 15 | 6.02 | 3.93 | 0 | 15 | 6245 |
| Peru | 10.68 | 3.49 | 0 | 15 | 8.30 | 4.92 | 0 | 15 | 7800 |
| Uruguay | 9.66 | 2.97 | 0 | 15 | 8.23 | 3.62 | 0 | 15 | 5793 |
| Venezuela | 9.93 | 3.34 | 0 | 15 | 7.22 | 4.34 | 0 | 15 | 7191 |

Weighted Sample Statistics: Means and Standard Deviations by Country.

Table A4: Harmonized Household Surveys

| Country | Years of education | (sd) | (min) | (max) | Y. of parental education | (sd) | (min) | (max) | N |
|---|---|---|---|---|---|---|---|---|---|
| Brazil | 8.40 | 4.49 | 0 | 22 | 5.30 | 4.42 | 0 | 22 | 18219 |
| Chile | 12.03 | 3.16 | 0 | 22 | 9.22 | 4.40 | 0 | 25 | 130750 |
| Colombia | 9.51 | 4.27 | 0 | 23 | 5.75 | 4.29 | 0 | 17 | 101040 |
| Ecuador | 9.02 | 3.87 | 0 | 22 | 6.54 | 4.41 | 0 | 20 | 17212 |
| Guatemala | 5.52 | 4.55 | 0 | 20 | 3.12 | 3.99 | 0 | 20 | 33517 |
| Mexico | 9.31 | 3.55 | 0 | 18 | 5.70 | 4.68 | 0 | 18 | 5883 |
| Nicaragua | 6.15 | 3.97 | 0 | 17 | 3.94 | 3.99 | 0 | 17 | 2360 |
| Panama | 9.97 | 4.23 | 0 | 24 | 7.57 | 4.96 | 0 | 17 | 12308 |
| Peru | 9.86 | 3.86 | 0 | 19 | 6.20 | 4.96 | 0 | 17 | 66175 |

Weighted Sample Statistics: Means and Standard Deviations by Country. Brazil: PNAD 1982, 1988, 1996; PDSD 2008. Chile: CASEN 2006, 2009, 2011, 2013. Colombia: ECV 2003, 2008, 2010-2013. Ecuador: ECV 1994, 1995, 1998, 2006. Guatemala: ENCOVI 2000, 2006, 2011. Mexico: MXFLS 2002, 2005, 2006, 2009-2012. Nicaragua: EMNV 1998. Panama: ENV 1997, 2003, 2009. Peru: ENAHO 2001-2012.

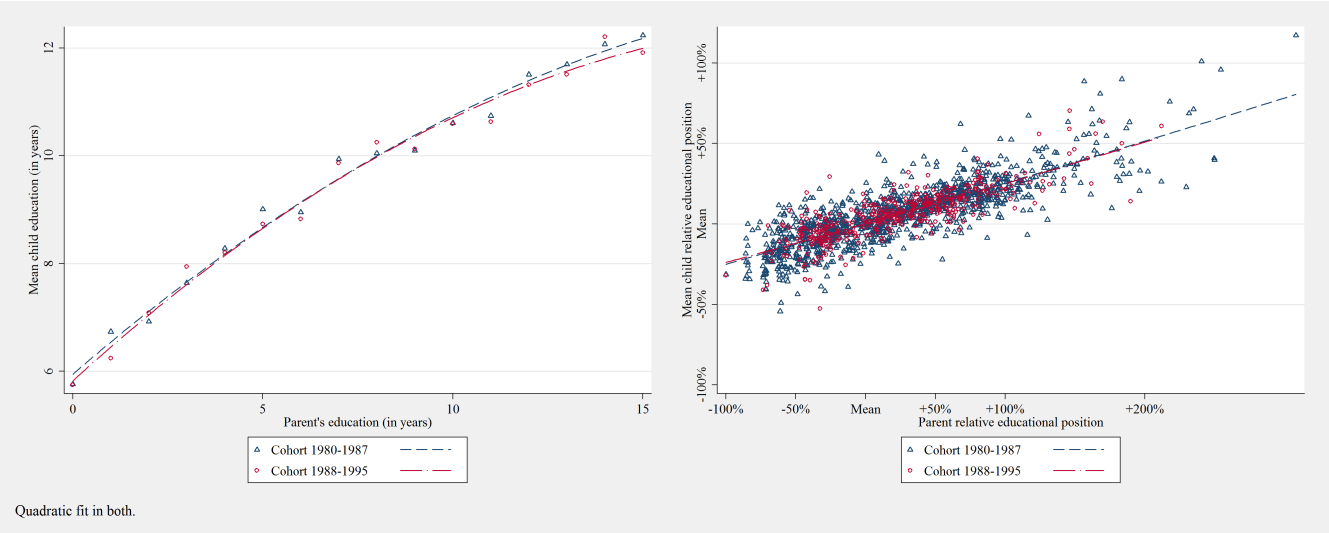



Figure A1: Completed years of education vs. Relative educational position by age, sex, country and cohort (Data: Latinobarometro, own estimates)

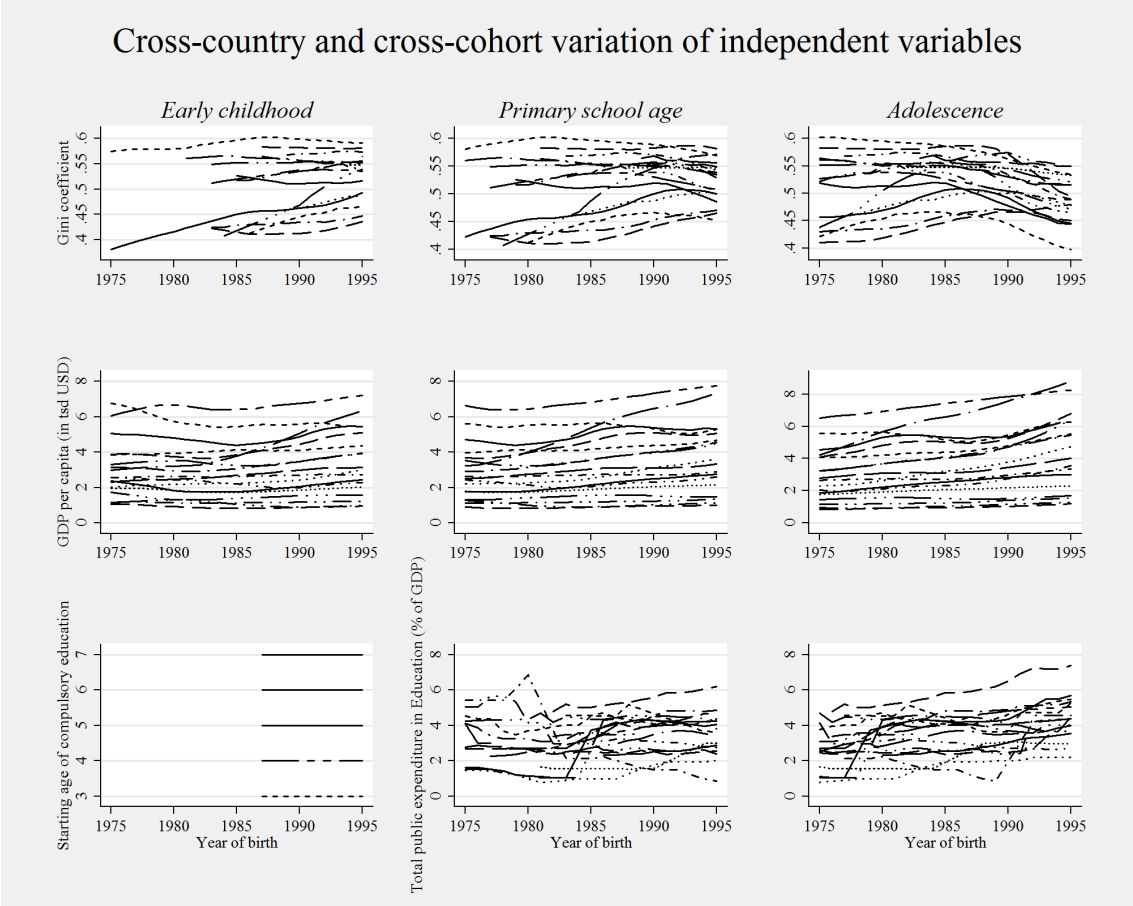



Figure A2: Variation of the independent macro-level variables between and within countries (Data: SED-LAC and World Bank Data)

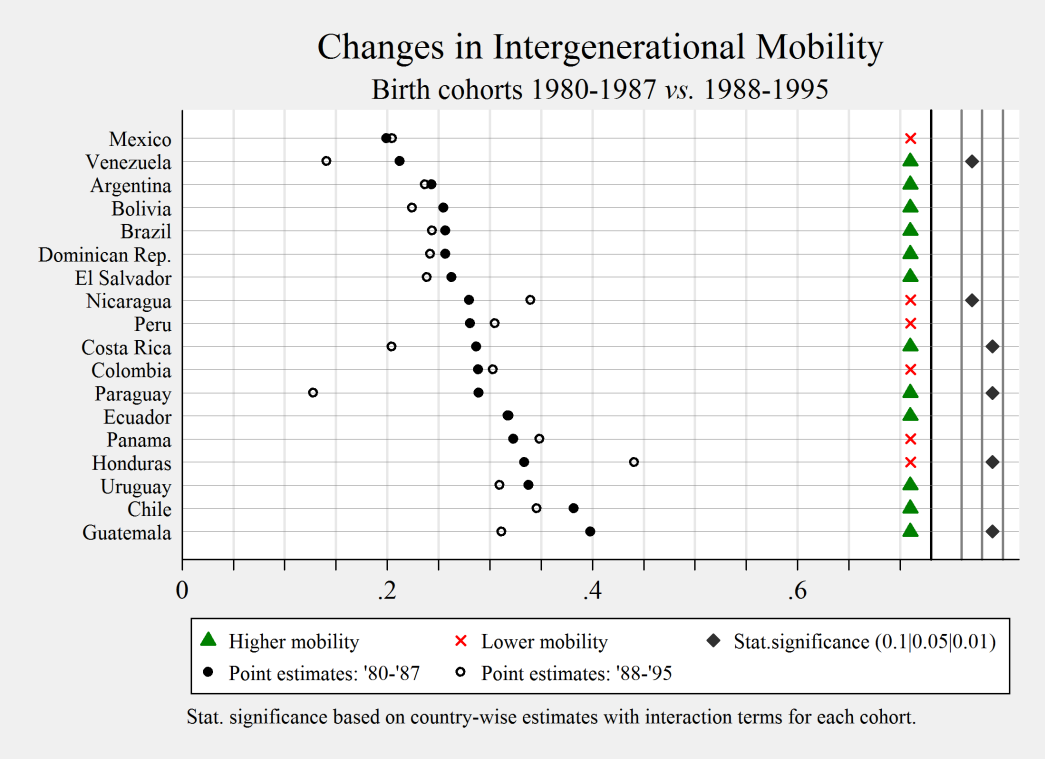



Figure A3: Intergenerational mobility in Latin America - Magnitude and statistical significance of changes in point estimates (Data: Latinobarometro, own estimates)

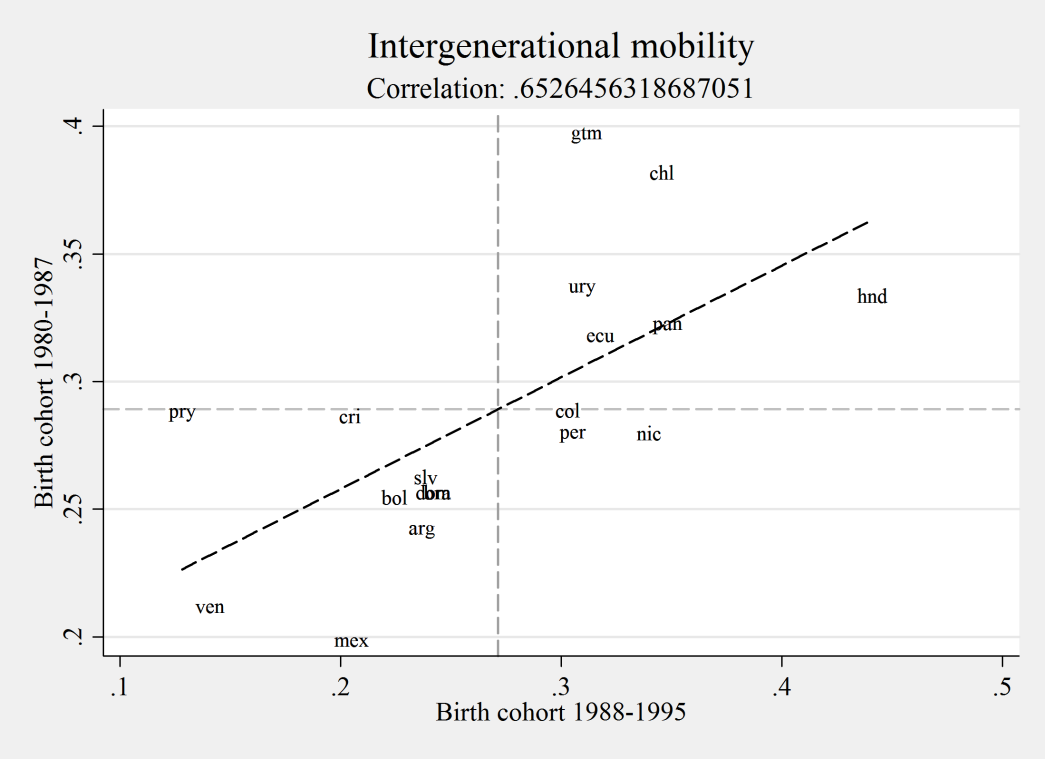



Figure A4: Intergenerational mobility in Latin America - Correlation in levels (Data: Latinobarometro, own estimates)

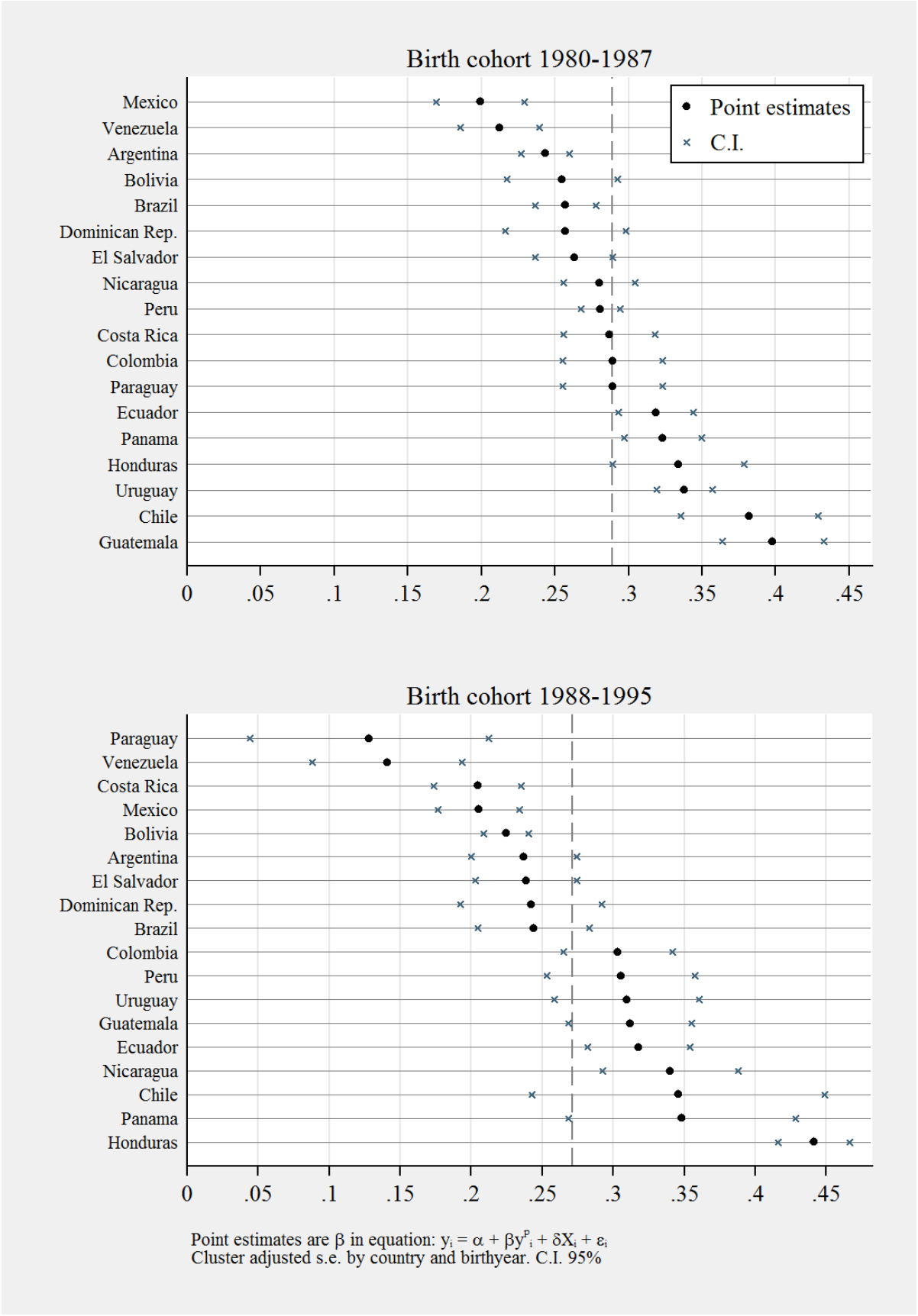
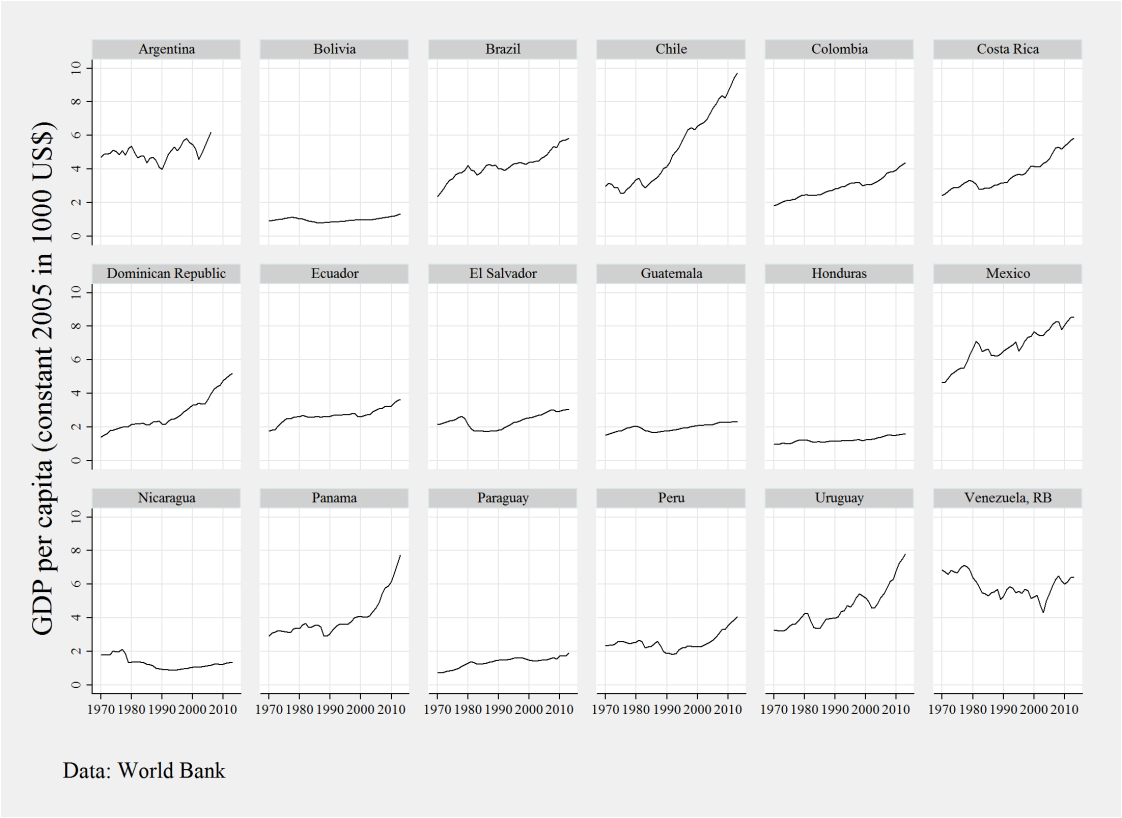
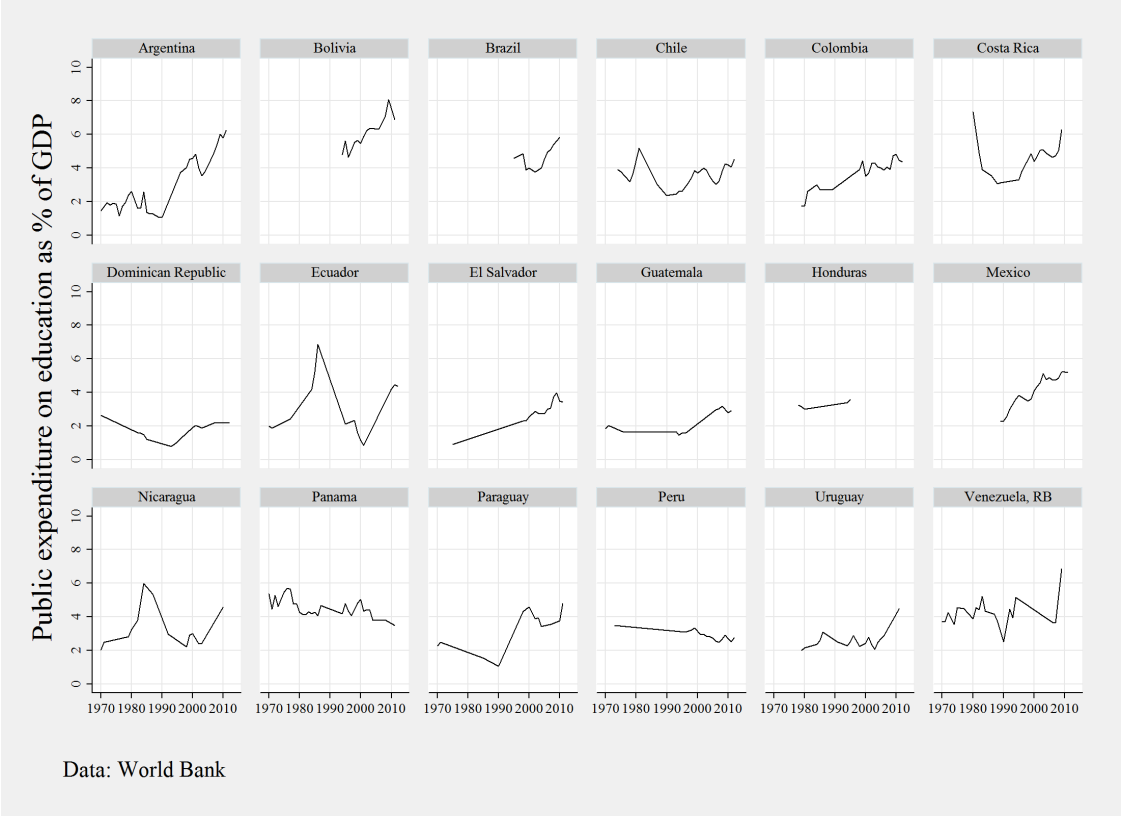



Figure A5: Intergenerational mobility in Latin America - Point estimates and confidence intervals (Data: Latinobarometro, own estimates)




(a) GDP per capita




(b) Public expenditures in education

Figure A6: Trends in Latin America

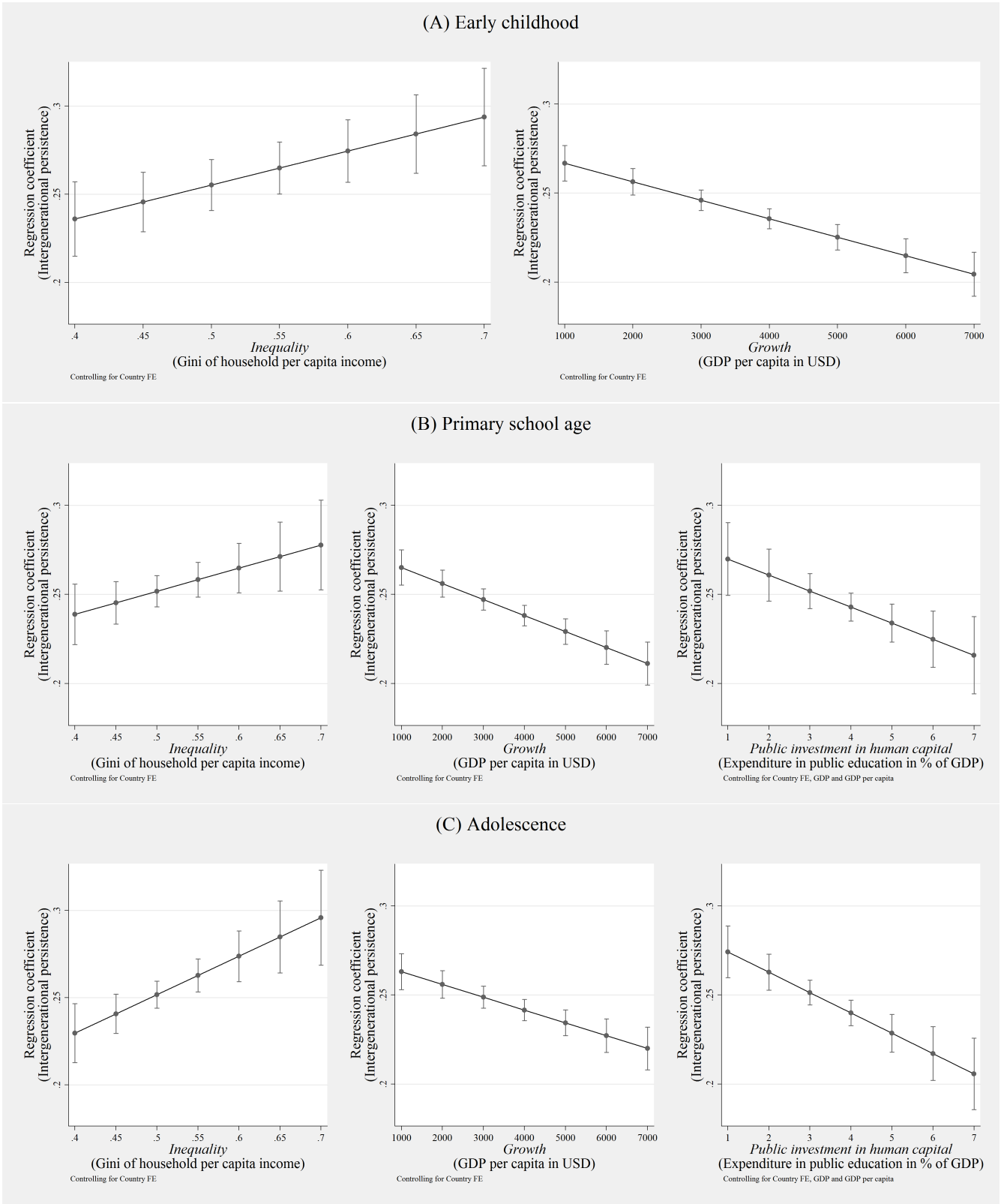



Figure A7: Determinants of intergenerational mobility - Marginal effects; See Section 4.4

# B ONLINE APPENDIX - For online publication

Available at https://sites.google.com/site/guidoneidhoefer/research/supplements

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