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ABSTRACT

Intergenerational Mobility: An Assessment for Latin American Countries

This paper aims to study the process of intergenerational income mobility in some Latin American economies (Panama and Brazil), which have been much neglected in the existing literature. Like other countries in the area, also Brazil and Panama have a stagnant economy coupled with high income inequality. Our rich and detailed dataset, the IPUMS survey data bank allows us to provide the most reliable and robust estimates of intergenerational transfer, after controlling for a number of additional control variables which were unavailable in previous studies, such as family size, literacy level of fathers, and location in rural versus urban areas. We provide estimates broken down for different genders, age, location, education of fathers in each country. Our results are robust to different specifications and suggest that previous studies significantly overrated the extent of the intergenerational transfer in the countries considered. However, our figures are still compatible with an extremely low degree of social mobility.

JEL Classification: J62, J60, D3, D6

Keywords: intergenerational mobility, occupational mobility, latin american economies

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Introduction

Intergenerational mobility concerns the relationship between socio-economic status of parents and socio-economic outcomes of their children as adults (Blanden, 2013). Without intergenerational link, the relationship between socioeconomic inequality and social outcomes is not possible.

For Friedman's (1957) permanent income hypothesis, utility is derived from the permanent income of an individual. Therefore, intergenerational mobility is an important source of utility and happiness for an individual. A classical regression which derives intergenerational mobility in terms of earning mobility is expressed as follows:

$$y_{ci}^{*} = a + \beta y_{pi}^{*} + u_{1i} \qquad (1)$$

where p_i denotes parent's income, c_i denotes child's income, u is an error term of the regression and β[1] therefore denotes the elasticity between child's income and parent's income. In other words β measures the intergenerational mobility between child and parent (Blanden, 2013). All the variables are in their natural logarithms. When $\beta = 0$, there is no association between incomes of parents and children; vice versa, where $\beta = 1$, there is a complete intergenerational transfer between the income of parents and children.

For Daude and Robano (2015), while there is a substantial literature on the intergenerational income mobility in the developed countries (see Black and Devereux, 2010; Solon, 2002 for a detailed synopsis for the literature on intergenerational income mobility), due to the data limitations, the literature on intergenerational income mobility in the Latin American context is much less numerous.

[1] $\beta = \dfrac{dE[\log ci \,|\, pi = x]}{d \log x}$, which is also considered a measure of relative intergenerational mobility (see Chetty at all., 2014).

Researching intergenerational mobility in the Latin American Region is an important research aim for a region in which agricultural production is prevailing and income inequality is still a reason of concern. The Latin American economies are also a subject to different development studies that examine the determinants of stagnant economic development rates (real GDP per capita) and high Gini index (see Word Bank WDI, 2019; OECD, 2015). As Solon (1999, p.1787) points out that as follows; "A more thorough comparison across countries, preferably including less developed countries, may eventually prove to be a useful way of generating clues about the determinants of intergenerational transmission of earnings status."

In this article, we examine the link between intergenerational income mobility for the Brazilian and Panama economy, two countries much neglected in the literature. This research has important policy implications for reducing income inequality through increasing the degree of intergenerational mobility and, indirectly, stimulate economic growth. As Blanden (2013) points out, public policy can be used in two ways to reach this policy target. First, public policy should make investment in favor of children (weakening heritability), and, second, it should provide financial support in favor of higher education to reducing the effect of credit constraints in accessing higher education. Therefore, public policy may be designed in a better way in the Latin American economies, based on the findings of this and other similar contributions.

Moreover, it should be spelled out clearly that the relationship between inequality and economic growth is negative, and the effect of income inequality on economic growth is negative and harmful (Alesina and Rodrik, 1994; Atkinson, 1997; Bénabou, 1996; Corneo and Jeanne, 2001; Galor and Zeira, 1993). Therefore, researching income inequality by focusing on intergenerational transmission of incomes gives a clear picture for persistence of inequality across generations in an economy. We choose Latin American economies since: a) those economies are subject to stagnant development rates; b) the change in Gini index are almost

negative in the last decade; c) and extreme poverty is much widespread (See Ferreira et al., 2013 for a more detailed discussion).

We use the very rich IPUMS database for estimating the intergenerational income by using a set of different control variables for both economies. Moreover, the current literature on the Latin American context is scarce, especially that based on a rich data base like the IPUMS database, which covers only these two countries in the Central and South American area. In the current literature, some studies emphasize that there is a high degree of social immobility in the Latin American countries (see Daude and Robano, 2015; for a provocative study that examine the intergenerational mobility in terms of education). Other studies provide mixed results[2] in terms of intergenerational income mobility (Dunn, 2007; Ferreira and Veloso 2006; Nunes and Miranda, 2007; Contreras, Fuenzalida and Núñez, 2006; Ferreira and Gignoux,2011; Grawe, 2001, see Table 7 below for more detailed information).

The main novelty of this article comes from three features. First, we use the very rich IPUMS survey which has more than 10 million observations[3]. This types of data is likely to provide more robust and unbiased estimates than those obtained with smaller data sets, especially in the case of a country like Brazil featured by a strong heterogeneity and a very large territory. Second, for Panama economy, we use also a rich dataset, and to the best of authors' knowledge, this study is one of the earliest studies on the intergenerational income mobility in the Panama economy. As such, this article aims to fill an important gap in the current literature by using a rich dataset, to supply new findings for the Panama economy. Third, we use a set of different control variables that may have and, in fact, do have a statistically significant impact on

[2] Some studies find there is a very low intergenerational income mobility for the Latin American countries, some do not. See Table 7 for detailed information on the findings available in the Latin American context.

[3] Most of the studies in the current literature use PNAD Database, especially, for the Brazilian economy in which there is no direct estimation for father's income. Therefore, the existing studies used an instrumental variable estimation of father's income usually based on two step IV or two sample IV estimations (see Table 7 of this article for a detailed information).

intergenerational income mobility, which are family size, education access, and rural living status, which should allow us providing the most accurate estimate available.

The rest of this article is organized as follows. In the next section, we give a literature review on intergenerational income transfers, and we try to show the link between this article and the current literature. In the third section, dataset, methodology and estimation results are discussed. In the final section, we provide summary remarks, with policy implications.

1. Review of the literature

The hypothesis that a more equal income distribution will lead to an increase in the level of welfare of the population, which is an important issue in the development literature, has drawn the attention of researchers on the need to eliminate differences in the level of development across individuals as well as solving the problem of poverty and providing world peace, as necessary pre-conditions (United Nations, 2007; Atkinson 1980). Investment in people's human capital is the main goal if one wants to make the socioeconomic situation better than it was for the previous generation. The main source of investment in human capital of an individual and a society is the income of parents. Thus, to understand better the socioeconomic consequences of inequality, it is necessary to look at inter-generational connections (Corak, 2006; Solon, 2004). In particular, to increase investment in a person's human capital, it is necessary that her socioeconomic status be better than that of the previous generation (Corak, 2006): in fact, it is assumed that parents share their current income for their children's consumption and investment in human capital as well (Solon, 2004).

Developing our understanding of welfare state and economic development has led researchers to request an increasing mobility of traditional societies from the social, political and economic point of view in order to reach a more modern and developed life (Boyd, 1973). There are three

mechanisms for increasing socioeconomic mobility. The first mechanism is a transfer of socioeconomic status through a biological transfer of capabilities; the second is the socioeconomic advantage of the previous generation to improve the position of the next generations; and the third mechanism is the improvement of the socioeconomic status of parents by means of their children's investment in human capital (Juarez, 2011).

In his study, Solon (2002) emphasized that transitions in the socioeconomic position between generations are important in two respects. First, the degree of intergenerational socioeconomic mobility can be examined to provide important evidence on income inequality and to develop policy recommendations to reduce it. Second element is that policy implications may be derived by studying the dynamics of intergenerational mobility; and by understanding what are the strengths and weaknesses in the transmission mechanism (Solon, 2002).

Intergenerational transfer is meant to be the relationship between the socioeconomic status of parents and the socioeconomic consequences on their children when the latter reach adulthood. This relationship can be measured by looking at various variables, such as incomes, earnings, expenditure, borrowing facilities, educational status, health status, social class, social status and occupation. In the modern world, most people want to change their lives with geographic or social mobility and achieve successful results in the above mentioned variables. Living conditions are influenced by historical transformations in the social structures as well as by the behavior of a single person or parent (Micklin and Leon, 1978).

The literature finds a strong relationship between individuals and their parents. This is referred to as the intergenerational transfer of social status. Although these results do not pose a problem in terms of the transfer of wealth or a good socioeconomic condition, equality of opportunities should be ensured in order to improve the conditions of individuals with poor socioeconomic conditions. Equality of opportunities is one of the most fundamental humanitarian goals of today's economic and political systems. If not, it is not possible to improve the intergenerational

socioeconomic position through genetic transitions alone and the transfer of inheritance or social capital (Blanden, 2009).

Since the success of the previous generation affects also that of the next generation, there is a link between intergenerational mobility and inequality. Therefore, the parents' investment in their children's education foresees a two-way connection between parents and their children. Because of this connection, poverty will continue for generations until when there continues to be no equality of opportunities for a poor generation (Carmichael, 2000; Nunez and Mianda, 2007). A recent strand of the literature is seeking evidence regarding the existence of poverty traps at an individual level in several developing countries (see, among others, Asadullah, 2012; Pastore, 2016).

In the available studies on the intergenerational transfer of socioeconomic status, basic variables such as education, occupation, income, borrowing constraints and migration were used to explain social mobility. The concept of equality of opportunities appears to be the basic element that is associated to social mobility regardless of which variable is used to measure it. In other words, social mobility is observed more frequently in societies that provide to their citizens equal opportunities (Tyree at all, 1979). Treiman (1970) stated that industrialization increased geographic mobility by bringing about progress in the fields of education, communication and urbanization and this led also to social mobility.

In the next section of this study, we will examine intergenerational mobility in terms of income transfer, a concept entered into the literature in the 1990s. In these studies, it is concluded that children in low-income families reach lower income levels when they reach adulthood compared to children grown up in high-income families (Neidhöfer at all., 2018; Heyneman and Loxely, 1983; Rothstein, 2019; Chetty at all., 2014).

In their study on the US economy, Chetty at all (2014) reckon that the probability of reaching a higher income level when grown up in a family with a child's lower income level was 4.4% in Charlotte and 12.9% in San Jose. This result shows us that there is a perfectly linear relationship between children' social status and their social status in adulthood. The most important reason for this relationship is to be found in the factors that affect the growth of children.

In their comparison of the US and Sweden, Björklund and Jantti (1997) found that the likelihood that boys will receive more income than their father's income was 0,329 for children living in the US, and 0.226 for children living in Sweden. In a similar study, Atkinson (1980) calculated a correlation coefficient of 0.42 for the UK in 1950, based on weekly incomes (Solon, 2002).

In another study for Canada, the correlation coefficient of the intergenerational income mobility was found to be equal to 0.2, similar to the US. The correlation coefficient went up to 0.4 when the upper income limits were taken into account (Corak and Heisz, 1999). In a similar study in which the US and Germany were compared, Couch and Dunn (1997) found a correlation coefficient of 0.11 in both countries. The authors concluded that the transfer between fathers and sons was similar in terms of working hours and annual earnings in the two countries. Moreover, the intergenerational mobility between mothers and daughters was higher in the US as women's participation in the labor market was higher there. Considering the US data, there are generally similar results. In general, in terms of children living in low-wage families, the transfer between generations is low. The reason for this is the fact that due to the low level of income of the family, the latter does not provide a human capital accumulation able to allow children to obtain high incomes in their life (Mazumder, 2005).

In a study relative to European Union Member States, it is stated that the highest income mobility among men is in Denmark and the lowest in Portugal (Sologon and O'Donoghue 2009). Bachman et al. (2016) emphasized the difference in gender and skills as a reason for this

mobility and concluded that equality of opportunities would also reduce income inequality. In another study on England, the intergenerational mobility parameter was found to be between 0.40-0.60 for men and 0.45-0.70 for women. This mobility is in accordance with the literature from lower to higher income groups (Dearden at all, 1997).

In one of the few studies available on Latin America, Nunez and Mianda (2007) study the equality of opportunities by considering the intergenerational income mobility between fathers and sons in Chile. In their study, while intergenerational mobility in Chile is similar to Brazil, nonetheless, it is low compared to other developed and developing countries, due to high income inequality. In Chile again, the intergenerational mobility coefficient was 0.54 in Nunes and Mianda (2007) and 0.67 in Contreras at all. (2006). In addition, Dunn (2007) found the intergenerational mobility coefficient for Brazil to be 0.53, while Ferreira and Veloso (2006) determined a range of 0.54-0.73 values across regions.

All in all, in the current literature, there has been a lacuna of research on intergenerational mobility in the Latin American region. We use a rich dataset, and different control variables for filling this lacuna.

2. Conceptual Framework and Research Methodology

2.1. Dataset and Motivation

In this article, we aim to model intergenerational income linkages in rural and urban areas, taking into account education access, parental characteristics, and some other conditions (i.e family size and age) in the two Latin American countries (Brazil and Panama) included in the IPUMS micro dataset relative to 2010.[4] The data bank provides us not only with direct

[4] We use the most recent waves for both countries.

information on the fathers' incomes, information which is often missing in most samples surveys; but also on a number of important control variables. This is a cross-section without a longitudinal dimension, but with a very large number of observations and an uncommon wealth of information. Many previous studies look just at simple correlations, or use different controls for other factors (i.e. age, education of father or mother, ethnicity), We control also for other factors, i.e. family size, rural living status, and education access, which might strongly affect the intergenerational transfer mechanism, as a recent literature has found (see Dunn, 2007; Ferreira and Veloso 2006; Nunes and Mianda ,2007; Contreras at all., 2006; Ferreira and Gignoux, 2011; Grawe, 2001; Neidhöfer at all., 2018).

In this article, we examine the relationship between intergenerational mobility and income inequality and how they differ by gender, and among those individuals whose father has achieved higher education. Unlike previous studies (Dunn, 2007; Ferreira and Veloso 2006; Nunes and Miaanda,2007; Contreras at all., 2006; Ferreira and Gignoux,2011; Grawe, 2001; Neidhöfer at all., 2018[5]), we use a different set of control variables. We distinguish between individuals living in rural areas, whose parents are endowed with different literacy rate (or human capital skills), and family size, and all the variables that have a potential effect on personal income (or child's income). Additionally, we use two cohorts for estimating the intergenerational mobility in the Latin American region, which are the young adults (20-24), and the so-called NYNA (neither young nor adults: 25-29). These cohorts are used for examining the effects of generations (i.e baby boomers, generation X) on personal income. Appendix 1 provides descriptive statistics of the main variables of interest for the two countries.

[5] Neidhöfer (2017) used a different dataset that consists of panel dataset with observations relative to individuals in different countries observed over a certain time span. With his data, he is able to control for some, but not all of the variables that we have (age, sex, and parental education) plus some additional controls for survey year fixed effects, household per capita income, and several macro variables at a country level (GDP per capita, public investments in human capital, public expenditures on education as of GDP). He used relative educational position as dependent variable.

2.2. Empirical Methodology

We follow the standard specification of the intergenerational model which benefits from the current literature. We use family size (Kumar and Quisumbing, 2012), gender (Ferreira and Gignoux, 2011), educational access or educational attendance (Nunes and Mianda, 2007; Blanden at all., 2005; 2007; Chetty at all., 2014), and rural and urban area living status (Chetty at all., 2014) for estimating the intergenerational mobility in the Latin American context.

We try to answer our research questions by using different methodologies, since the model specification plays an important role and, conversely, since model misspecification leads to significant misinterpretations in the survey data, we employ a linear regression specification of the Intergenerational Mobility Model (IGM):

$$Logincomec_i = \beta_0 + \beta_1 Logincomep_i + \beta_2 age_i + \beta_3 fsize_i + \beta_4 location_i + \beta_5 Educationacc_i + \varepsilon_i \qquad [1]$$

where *Logincomec* denotes total income of children in natural logarithm, *fsize* denotes family size[6], *location* denotes whether the family is located in a rural or urban area. *Educationacc* denotes access to education of a child. We use *literacy* as a proxy for access to education of a child. *Age* denotes the age of a child. ε denotes the error term of the regression model, and i subscript denotes each individual in the sample. We assume $\beta_1>0$ as our main coefficient of interest, namely the coefficient of intergenerational transmission of income. We also expect that $\beta_2>0$, and $\beta_5>0$ since income is increasing by age and access to education. Finally, we expect that $\beta_3\leq0$, and $\beta_4\leq0$: in fact, the larger is family size the lower is the investment of a household on each child's education; and, for obvious reasons, living in rural areas is expected to have a negative effect on children' income, since incomes in rural areas are typically lower relative to urban areas. As a robustness check and also to draw further information on specific

[6] Following Kumar and Quisumbing (2012:580) family size controls the amount of labour resources in the household in a rural area. Since rural households are subject to farm operations (especially ploughing) in the Latin American Region is male intensive.

demographic groups, we replicate our estimates by gender, different age cohorts, the education access of the father and the location of the family.

3. Empirical Findings

3.1.Main Findings

The estimation results of equation [1] for Brazil and Panama are given in Table 1. The R^2 is quite satisfactory for this type of estimates in both cases, but clearly it is much higher for Brazil, although the sample size is much bigger and, therefore, presumably more heterogeneous. All the OLS models are estimated by using robust variance-covariance matrix. The effects of literacy, living in rural area, age, and family size on income of a child are as expected for both economies. Literacy and age have a positive and statistically significant effect on the income of a child, while family size and living in a rural area have a negative effect on the income of a child. However, the sign of the effect is statistically insignificant in the case of Panama. The intergenerational income coefficients are 0.42 and 0.28 for the Brazilian and Panamanian economy, respectively.

<Insert Table 1 here>

Table 2 reports the findings by gender. The obtained findings from the Models 3 through 6 show that the extent of intergenerational mobility is greater for male children in the Brazilian economy, while it is slightly greater for female children in Panama. The sign and size of the coefficients of control variables show some differences by gender. Education access has a statistically positive impact, slightly higher for men, and is, in one case (women in Panama), not statistically significant. In rural areas, female children earn less than their male counterparts, probably because they are more involved in non-market work within the family. The non-statistically significant impact of family size noted in the previous general estimate is mainly

due to the case of men in Panama: it may be interpreted as a sign that in Panama even with the family size increasing, male children are not affected. In Brazil, family size is especially reducing the income opportunities for women, but also men are affected, though to a lesser extent.

<Insert Table 2 here>

3.2. Further Dimensions of Intergenerational Income mobility

The effects of father's education

The estimation results where we examine the effect of intergenerational income transfers by education access of fathers are given in Table 2 under the Models 7 through 10. As expected, in Brazil the transmission of income from father to child is greater for literate than for illiterate fathers. Strangely enough, though, the opposite result is found for Panama. In other words, in Panama, the intergenerational transfer of income is greater among illiterate rather than literate fathers. Moreover, the obtained findings from Model 9 and 10 show that the effect of literacy status of a father has a negative effect on the intergenerational income in Panama. This is probably a sign of the low returns to education in Panama, a country where non-market work is an important part of incomes and the returns to education are lower than elsewhere.[7]

The effects of generational differences

Table 3 disentangles the cases of different age cohorts. The estimates confirm, with some small differences, the coefficients relative to the control variables contained in the previous table. Interestingly, the coefficient of intergenerational transfer is higher among older individuals in

[7] Our findings are consistent with the findings of Psacharopoulos (1994) show that there is a slight difference between returns to education of secondary and higher school education in Panama.

both groups of countries. This is due also to the fact that young age individuals tend generally to earn less on average as compared to their elderly peers, which causes some downward bias in the coefficient of intergenerational income mobility.

The effects of rural living conditions

The additional robustness checks are used to estimate the impact of rural living status on intergenerational income mobility. In this estimation, we remove rural living status from our main model (see Equation 1) and estimate the differences between the rural and urban living status as a whole, and such difference is examined by gender. In Table 3, the intergenerational mobility of rural area inhabitants in Brazil is 0.42 (model 15). The effect is greater for men (model 16) than for women (model 17). In Brazil, as expected, the intergenerational mobility elasticity for the child who lives in urban areas (model 20) is more than that of those who live in rural areas (model 15). As to gender effects, the coefficient of intergenerational mobility of male children (0.42 in model 18) is smaller than that of women who live in urban areas (0.45 in model 19). Furthermore, there is a huge difference of intergenerational mobility between female children who live in rural (0.38 in model 17) and in urban areas (0.45 in model 19). For Panama, there is a huge difference between children who live in rural areas in terms of gender (models 22-25). In addition, there is a huge difference between the female children who live in rural (0.18 in model 23) and those who live in urban areas (0.286 in model 24) in Panama. The obtained findings suggest that the male children, who live in rural areas, have more intergenerational income mobility than those who live in urban areas (see model 22 and model 24). This may be due to the fact that poverty is more widespread in urban areas, also due to the very high unemployment rate as compare to rural areas (in our dataset the number of unemployed people equals 367417 in rural areas, which is more than the number of those who live in urban areas (242954) for Brazil, whereas Panama has 2631 unemployed people in urban areas, three times less than in rural areas (7509). Moreover, we estimate an unemployment rate

for Brazil of 13%, and for Panama of 7%. The rural area unemployment rate is 24%, and 6% in Brazil and Panama, respectively. The urban area unemployment rate is 10% and 7% for Brazil and Panama, respectively.

<Insert Table 3 here>

In Table 4, we examine the generation effects on intergenerational income transfers in both countries. We find that a late born child has more advantages than the child whose age is between 25 and 29 in both countries. The findings are in line with those in Pastore and Roccisano (2015) for a number of developing countries.

<Insert Table 4 here>

In Table 5, the additional findings for intergenerational mobility in Brazil and Panama are depicted. The obtained findings show that in Brazil, both married female, and single female have the highest intergenerational income mobility elasticity (see the models between model 27 and model 30). For Panama, single and male people have the highest intergenerational income mobility elasticity (see the models between model 31 and model 34). In Table 6, we measure the intergenerational mobility according to gender, marital status and rural or urban living status in both countries. In Brazil, the highest intergenerational mobility elasticity belongs to married women, living in urban areas (0.44), while in Panama, surprisingly, it belongs to married men living in rural areas (0.45).

<Insert Table 5 here>

<Insert Table 6 here>

For ease of consultation and of comparison with the findings relative to other countries, we have summarized in Figure 3, all the estimated coefficients of intergenerational transfer discussed above. Beyond internal differences by gender, location and other demographic

factors, it is apparent that in Brazil the process on intergenerational transfer of income from fathers to their children is far stronger, which confirms the greater degree of income inequality in this country.

<Insert Figure 1 here>

In Figure 2, following Krueger (2012), and Corak (2013)'s seminal works, we generate 'the Great Gatsby Curve', which shows the relationship between income inequality and intergenerational income mobility. In Figure 2, we put our results for Panama and Brazil. The curve shows that the relationship between intergenerational income elasticity and inequality is positive and high for Brazil and Panama.

<Insert Figure 2 here>

An international comparison

When we compare the findings of this article with those presented in the existing literature on intergenerational mobility at an international level, the findings of this article are slightly below those found in the current literature on the Brazilian economy. Table 7 provides a snapshot of the main findings of the existing literature, together with ours. We have several terms of comparison for Brazil, but only one for Panama. For instance, Dunn (2007) and Ferreira and Veloso (2006) found an intergenerational coefficient between 0.53 and 0.73.

How to explain these differences. Well, the first candidate to an explanation is the sample size of ours in comparison to previous studies: we use a very rich dataset including more than 9 million observations. Our results may give a more accurate and clearer insight on the Brazilian economy, and should be able to take into account the large heterogeneity existing in this country which is as large as a continent. Another crucial difference may come from our rich set of control variables: unlike previous studies relative to the Brazilian economy, which, in most part, simply correlate fathers' and children' incomes or use age, ethnicity, region, occupation and

household education level, we control also for family size, rural versus urban areas, access to education of fathers (see Dunn, 2007; Ferreira and Gignoux, 2011; Ferreira and Veloso, 2006). Actually, the usage of literacy levels at an individual level is another novelty with respect to the current literature. For instance, Ferraira and Gignoux (2011) used father's and mother's education only at the household level and, therefore, with a much lower level of accuracy. All this might well explain why previous studies overrated the extent of the intergenerational transfer of incomes.

For Panama economy, our findings may shed a light for further studies. In the Latin American countries, there are different findings on intergenerational mobility, but all return a coefficient range between 0.53 and 0.67. In the only study currently available for Panama (Neidhöfer at all., 2018), the obtained finding relative to intergenerational transmission of education is well below the average of other Latin American countries (around 0.32-0.34 according to his estimations.). This confirms that Panama has a lower level of income inequality than other countries in the area (see Table 7). Moreover, similar to the case of Brazil, also for Panama our study provides a lower level estimate. The reasons are probably the same as those mentioned above for Brazil.

<Insert Table 7>

4. Concluding remarks

In this study, we estimate intergenerational mobility in two important Latin American countries, Brazil and Panama, by using the rich IPUMS surveys. Intergenerational income mobility is an essential factor able to determine the inequality transmission between generations within and across countries. This article is expected to fill in a significant lacuna in the intergenerational income mobility literature. It does so, first, by covering countries

which are still much neglected in the literature, especially Panama. Second, the wealth of information of our data bank in terms both of the large number of observations and of control variables allows us providing the most robust and reliable estimates available. We find that previous studies overrated the extent of the intergenerational transfer, because they controlled less for the heterogeneity across individuals, regions and other determinants of children' incomes than we are able to do thanks to our large data bank. Our estimates for intergenerational income transfer is of 0.42 for Brazil and 0.28 for Panama, against an estimate from previous studies of between 0.50 and 0.70 for Brazil and of about 0.32-0.34 for Panama.

However, our coefficients are perfectly compatible with the high degree of income inequality existing in the countries considered. It is likely that without removing the factors that lead to such a dramatic process of intergenerational transfer of incomes, the degree of income mobility will remain unsatisfactory and economic growth will remain lower than its potential. Our study is supportive of policies aimed at removing the obstacles that hinder access to further education for children, therefore, condemning them to an inescapable poverty trap.

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Appendix. Descriptive Statistics

Brazilian Economy

Table A1. Descriptive Statistics for Brazilian Economy Dataset

Variable	Obs	Mean	Std. Dev.	Min	Max
Logincomec	5464342	6.4365	1.0347	0	14.3774
Educationacc	9693058	0.8073	0.3944	0	1
rural	9693058	0.2336	0.42311	0	1
age	9693058	31.4714	20.6465	0	100
logincfa	2750076	6.7155	0.9386	0	14.3774
famsize	9693058	4.1771	2.0387	1	42

Table A2. Descriptive Statistics for Panama Economy Dataset

Variable	Obs	Mean	Std. Dev.	Min	Max
Logincomec	186507	5.843131	1.8239	0	11.5129
Educationacc	341118	0.754724	0.4302	0	1
rural	341118	0.349741	0.4768	0	1
age	341067	29.98	21.0344	0	100
logincfa	104929	6.097605	1.7102	0	11.5129
famsize	341118	4.723597	2.7295	1	28

Note: All the variables are based on IPUMS Household Survey Database at which the surveys are done in 2010 for both countries.

Table 1. OLS estimates of intergenerational income persistence

	(1) Log(incomec): Brazil	(2) Log(incomec): Panama
Logincfa	0.424***	0.283***
	(313.41)	(27.92)
Educationacc	0.337***	0.108*
	(52.09)	(2.26)
Rural	-0.174***	-0.527***
	(-59.45)	(-20.13)
age	0.0462***	0.0559***
	(313.64)	(47.76)
famsize	-0.0406***	-0.00333
	(-70.31)	(-0.71)
β_0	2.022***	2.494***
	(163.17)	(29.37)
N	713585	28500
R^2	0.33	0.18
F stat, p value	0.00	0.00

Note: t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All the estimations are done by robust standard errors to control for heteroscedasticity and autocorrelation in our sample.
Source: own elaboration on IPUMS data.

Table 2. Additional Findings for the Intergenerational Income

	(3) Log(incomec): Panama Female	(4) Log(incomec): Panama Male	(5) Log(incomec): Brazil Female	(6) Log(incomec): Brazil Male	(7) Log(incomec): Brazil Father's ed.=literate father	(8) Log(incomec): Brazil Father's ed.=illiterate father	(9) Log(incomec): Panama Father's ed.=literate father	(10) Log(incomec): Panama Father's ed.=illiterate father
logincfa	0.232***	0.315***	0.437***	0.418***	0.409***	0.318***	0.264***	0.390***
	(15.70)	(23.52)	(201.55)	(242.63)	(276.90)	(72.61)	(25.02)	(11.69)
rural	-0.664***	-0.467***	-0.257***	-0.169***	-0.136***	-0.184***	-0.517***	-0.450***
	(-16.71)	(-13.69)	(-48.91)	(-49.03)	(-39.73)	(-32.66)	(-19.37)	(-4.05)
age	0.0576***	0.0543***	0.0463***	0.0470***	0.0527***	0.0306***	0.0607***	0.0210***
	(33.85)	(33.93)	(213.24)	(239.07)	(306.06)	(106.09)	(49.17)	(5.28)
Educationacc	-0.0538	0.208**	0.278***	0.403***	0.209***	0.196***	0.0535	0.0919
	(-0.82)	(3.06)	(22.38)	(53.66)	(21.77)	(23.82)	(1.08)	(0.58)
famsize	-0.0197**	0.00896	-0.0504***	-0.0279***	-0.0437***	-0.0201***	-0.00581	-0.0105
	(-2.71)	(1.47)	(-53.43)	(-39.43)	(-64.97)	(-18.34)	(-1.17)	(-0.72)
β_0	2.905***	2.254***	1.893***	2.025***	2.147***	2.915***	2.573***	2.735***
	(23.58)	(19.74)	(89.26)	(131.83)	(143.78)	(98.85)	(29.13)	(9.20)
N	11632	16868	287608	425977	593540	120045	26592	1908
R2	0.20	0.18	0.34	0.33	0.34	0.19	0.19	0.16
F stat., p val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: See the notes under Table 1.

Table 3. Additional Robustness Checks: Generation Effects

	(11) Log(incomec): Panama Age Cohort 1: 20-24	(12) Log(incomec): Panama Age Cohort 2: 25-29	(13) Log(incomec): Brazil Age cohort 1: 20-24	(14) Log(incomec): Brazil Age cohort 2: 25-29
logincfa	0.287***	0.294***	0.328***	0.404***
	(13.08)	(10.42)	(151.50)	(130.57)
Educationacc	-0.164	0.116	0.207***	0.352***
	(-0.49)	(0.29)	(16.74)	(23.51)
rural	-0.427***	-0.628***	-0.183***	-0.271***
	(-7.96)	(-8.49)	(-40.69)	(-38.55)
famsize	-0.0205*	-0.0176	-0.0482***	-0.0559***
	(-2.20)	(-1.47)	(-52.44)	(-43.32)
agecoh1	0.0955***		0.0504***	
	(6.15)		(48.33)	
agecoh2		0.0439		0.0152***
		(1.77)		(7.33)
β_0	2.431***	3.306***	3.065***	3.328***
	(4.93)	(4.08)	(102.06)	(52.66)
N	6135	3237	199293	95036
R2	0.10	0.14	0.25	0.32
F stat., p val.	0.00	0.00	0.00	0.00

Note: See the notes under Table 1.

Table 4. Additional Robustness Checks: Rural & Gender Effects on Intergenerational Mobility

	(15) Log(Income): Brazil: Rural	(16) Log(Income): Brazil: Rural & Male	(17) Log(Income): Brazil: Rural & Female	(18) Log(Income): Brazil: Urban & Male	(19) Log(Income): Brazil: Urban & Female	(20) Log(Income): Brazil: Urban	(21) Log(Income): Panama: Rural	(22) Log(Income): Panama: Rural & Male	(23) Log(Income): Panama: Rural & Female	(24) Log(Income): Panama: Urban & Male	(25) Log(Income): Panama: Urban & Female	(26) Log(Income): Panama: Urban
Logincfa	0.419***	0.437***	0.384***	0.416***	0.449***	0.429***	0.280***	0.337***	0.177***	0.288***	0.286***	0.287***
	(127.76)	(111.15)	(66.04)	(217.65)	(191.83)	(288.28)	(18.75)	(17.15)	(8.69)	(16.36)	(13.62)	(21.22)
Educationacc	0.201***	0.289***	0.0441*	0.457***	0.370***	0.397***	0.277***	0.339***	0.144	0.0819	-0.208*	-0.0425
	(20.67)	(25.71)	(2.35)	(46.14)	(23.26)	(46.80)	(4.44)	(3.77)	(1.75)	(0.82)	(-2.13)	(-0.61)
age	0.0329***	0.0335***	0.0317***	0.0518***	0.0498***	0.0502***	0.0487***	0.0483***	0.0474***	0.0585***	0.0633***	0.0606***
	(108.41)	(88.12)	(66.24)	(224.98)	(205.82)	(298.37)	(25.26)	(18.91)	(16.38)	(28.47)	(30.16)	(41.18)
famsize	-0.0384***	-0.0266***	-0.0464***	-0.0289***	-0.0517***	-0.0418***	-0.00511	0.00818	-0.0223*	0.00731	-0.0161	-0.00256
	(-33.68)	(-19.60)	(-23.32)	(-35.01)	(-48.50)	(-62.81)	(-0.74)	(0.90)	(-2.17)	(0.91)	(-1.58)	(-0.40)
β_0	2.311***	2.152***	2.510***	1.875***	1.640***	1.843***	2.007***	1.691***	2.602***	2.447***	2.545***	2.489***
	(93.85)	(73.47)	(56.23)	(105.20)	(67.75)	(129.10)	(18.20)	(11.48)	(16.59)	(16.12)	(14.88)	(21.99)
N	147830	99457	48373	326520	239235	565755	10194	6457	3737	10411	7895	18306
R2	0.23	0.25	0.20	0.34	0.34	0.33	0.14	0.15	0.13	0.14	0.16	0.15
F stat., p val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: See the notes under Table 1.

Table 5. Additional Robustness Checks: Gender & Marritial Status Effects on Intergenerational Mobility

	(27) Log(Income):: Brazil Married & Female	(28) Log(Income): Brazil: Single & Female	(29) Log(Income): Brazil: Single & Male	(30) Log(Income): Brazil: Married & Male	(31) Log(Income): Panama Married & Female	(32) Log(Income): Panama: Single & Female	(33) Log(Income): Panama: Single & Male	(34) Log(Income): Panama: Married & Male
Logincfa	0.455***	0.452***	0.420***	0.436***	0.274***	0.281***	0.408***	0.347***
	(222.45)	(87.30)	(96.75)	(283.42)	(22.98)	(10.34)	(12.19)	(38.35)
Educationacc	0.224***	0.707***	0.630***	0.400***	-0.132*	0.110	0.538	0.186***
	(18.97)	(30.73)	(40.68)	(55.52)	(-2.36)	(0.32)	(1.37)	(3.54)
age	0.0536***	0.0209***	0.0135***	0.0526***	0.0691***	0.0152***	0.0150**	0.0587***
	(257.77)	(47.84)	(34.46)	(301.17)	(36.75)	(3.66)	(3.10)	(36.98)
famsize	-0.0582***	-0.0436***	-0.0280***	-0.0321***	-0.0468***	-0.0475**	0.00752	-0.00479
	(-56.12)	(-22.73)	(-16.91)	(-42.20)	(-6.18)	(-2.94)	(0.37)	(-0.81)
β_0	1.661***	2.004***	2.772***	1.765***	2.415***	3.827***	2.556***	1.886***
	(84.93)	(43.30)	(76.62)	(128.57)	(24.65)	(9.03)	(5.17)	(23.24)
N	247375	40233	40209	385768	10101	1531	924	15944
R2	0.35	0.25	0.27	0.34	0.19	0.07	0.14	0.16
F stat., p val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: See the notes under Table 1.

Table 6. Additional Robustness Checks: Rural & Gender & Marritial Status Effects on Intergenerational Mobility

Panel A: Brazil

	(35) Log(Income): Brazil: Female & Married & Living in rural area	(36) Log(Income): Brazil: Female & Married & Living in Urban area	(37) Log(Income): Brazil: Female & Single & Living in rural area	(38) Log(Income): Brazil: Female & Single & Living in urban area	(39) Log(Income): Brazil: Male & Married & Living in rural area	(40) Log(Income): Brazil: Male & Single & Living in rural area	(41) Log(Income): Brazil: Male & Married & Living in urban area	(42) Log(Income): Brazil: Male & Single & Living in urban area
Logincfa	0.381***	0.446***	0.376***	0.423***	0.437***	0.428***	0.414***	0.394***
	(65.51)	(201.11)	(22.50)	(78.11)	(122.31)	(34.74)	(205.79)	(85.96)
Educationacc	-0.0386	0.258***	0.390***	0.749***	0.261***	0.446***	0.429***	0.634***
	(-1.81)	(17.64)	(9.52)	(26.32)	(22.37)	(16.05)	(39.25)	(32.82)
age	0.0367***	0.0576***	0.0144***	0.0220***	0.0368***	0.00511***	0.0589***	0.0152***
	(70.18)	(256.41)	(12.25)	(47.91)	(102.75)	(5.05)	(216.62)	(36.77)
famsize	-0.0520***	-0.0559***	-0.0221***	-0.0442***	-0.0286***	-0.0220***	-0.0318***	-0.0263***
	(-22.01)	(-48.60)	(-4.98)	(-21.06)	(-19.32)	(-6.03)	(-35.39)	(-14.26)
β_0	2.549***	1.625***	2.514***	2.189***	2.122***	2.889***	1.775***	2.929***
	(55.46)	(72.35)	(20.31)	(42.88)	(76.48)	(31.88)	(93.17)	(73.57)
N	41951	205424	6422	33811	91917	7540	293851	32669
R2	0.22	0.37	0.12	0.24	0.26	0.19	0.35	0.26
F stat., p val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Panel B: Panama

	(42) Log(Income): Panama: Female & Married & Living in rural area	(43) Log(Income): Panama: Female & Married & Living in Urban area	(44) Log(Income): Panama: Female & Single & Living in rural area	(45) Log(Income): Panama: Female & Single & Living in urban area	(46) Log(Income): Panama: Male & Married & Living in rural area	(47) Log(Income): Panama: Male & Single & Living in rural area	(48) Log(Income): Panama: Male & Married & Living in urban area	(49) Log(Income): Panama: Male & Single & Living in urban area
Logincfa	0.168***	0.280***	0.203***	0.287***	0.332***	0.459***	0.286***	0.305***
	(10.21)	(16.01)	(4.58)	(8.10)	(25.31)	(7.97)	(21.24)	(7.14)
Educationacc	0.0459	-0.351***	0.272	-1.854*	0.316***	0.00160	0.00684	1.638*
	(0.58)	(-4.63)	(0.62)	(-2.35)	(4.01)	(0.00)	(0.10)	(2.07)
age	0.0530***	0.0732***	-0.000197	0.0188***	0.0506***	0.0150	0.0633***	0.0136*
	(17.27)	(31.20)	(-0.02)	(4.14)	(19.67)	(1.62)	(31.62)	(2.46)
famsize	-0.0344***	-0.0167	-0.0102	-0.0417*	0.00834	-0.0216	0.00333	0.0299
	(-3.32)	(-1.55)	(-0.38)	(-2.00)	(0.96)	(-0.56)	(0.40)	(1.30)
β_0	2.678***	2.512***	3.911***	5.766***	1.689***	2.688***	2.449***	2.157*
	(20.36)	(17.79)	(6.26)	(6.93)	(14.32)	(3.54)	(21.08)	(2.47)
N	3265	6836	472	1059	6158	299	9786	625
R2	0.13	0.17	0.04	0.07	0.15	0.17	0.14	0.08
F stat., p val.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: See the notes under Table 1.

Table 7. The Comparison of the estimated findings with empirical literature on intergenerational mobility in the Latin American context

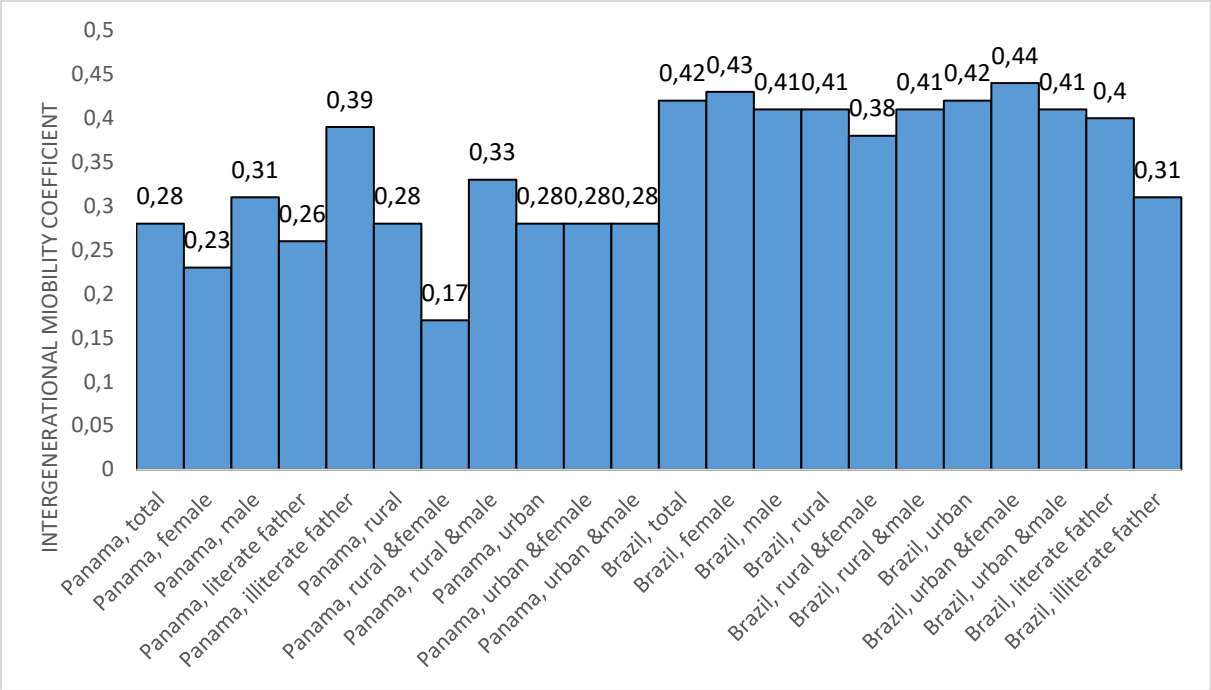
Study	Country	IGM coefficient	Type of data	Source of data	Time coverage	Sample size	Income of father measurement	Control variables	Individual level (I) or household level (H)
Dunn (2007)	Brazil	0.53 (OLS) 0.69(IV, TSIV)	Panel data	PNAD[a]	1982,1988, and 1996 surveys	24,873 obs.	Father's education	Son's age, and the square of a son's age (some models include age and square of age of a father)	I
Ferreira and Veloso (2006)	Brazil	0.54-0.73 according to the regions	Cohort	PNAD[a]	1976, 1981, 1986, 1990	59,340 obs.	Wage in the two step estimations.	Square of a father's wage.	I
Nunes and Miranda (2007)	Chile	0.54 (when Potential experience, Schooling is used), 0.52 (when Potential experience, schooling, occupation are used)	Cross section	Employment and Unemployment Survey of Uni. de Chile	2004	649 father-son pairs	Potential experience, Schooling, and Potential experience, schooling, occupation	No control variables are used. Only for alternative models, centiles of a father's income are used.	I
Contreras, Fuenzalida and Núñez (2006)	Chile	0.67		SIALS			Schooling		I

Ferreira and Gignoux (2011)[8]	Brazil, Panama	0.57 for Brazil, 0.51 for Panama	Cross section	PNAD [a] for Brazil, ENV for Panama	1996 for Brazil, 2003 for Panama	70,521 for Brazil, 4.556 for Panama	Father's education.	Ethnicity, father's occupation, mother's and father's education, Birth region	H
Grawe (2001)	Peru	0.66 (average)	Cross-section	The World Bank LSMS	1985	98 obs. for sons, 166 obs. for fathers.	Father's education	No.	I
This study	Brazil	0.42	Cross-section	IPUMS	2010	More than 10 million obs.	IPUMS database has father's income information and thus there is no need for any proxy or IV estimation.	Family size, Age, Living status in rural or urban area, education access of a child,	I
This study	Panama	0.28	Cross-section	IPUMS	2010	More than 100, 000 obs.	IPUMS database has father's income information and thus there is no need for	Family size, Age, Living status in rural or urban area, education access of a child,	I

[8] In Ferreira and Gignoux (2011), the intergenerational mobility is not the main concern of the study. However, they use a different estimation fort he intergenerational income.

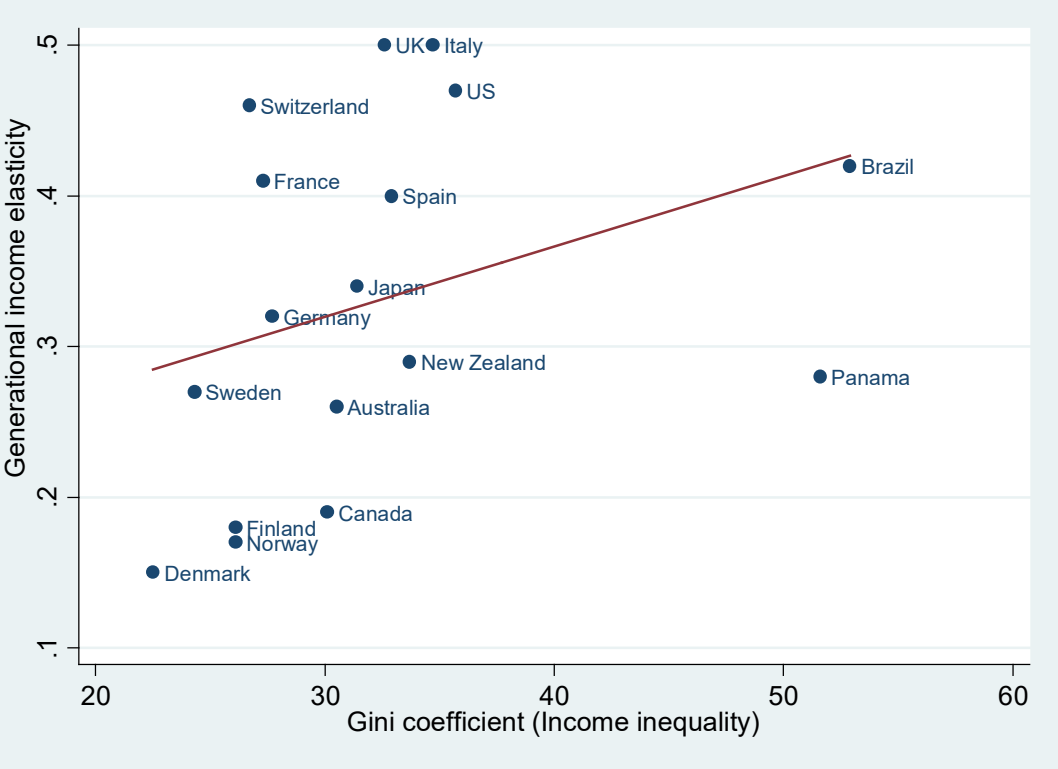
							any proxy or IV estimation.		

Note: a : in PNAD, there is no direct estimate for father's education, especially in the 1996 version. In the PNAD data, the representative power of the survey is poor, especially in the rural North area of Brazil.



Source: Authors' estimations based on IPUMS Database.

Figure 1. Summary of the Findings of this Study



Source: Adapted from Corak (2013). The Gini coefficients are based on Förster and d'ércole (2005), most of the data are based on OECD's household income surveys, except Brazil and Panama. For Brazil and Panama, we use the World Bank (2019)'s Gini coefficients data since the OECD database has no available information on those countries.

Figure 2. The Great Gatsby Curve and Our Findings