Social Mobility and Economic Development

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We explore the role of social mobility as a driver of economic development. First, we map the geography of intergenerational mobility of education for 52 Latin American regions, as well as its evolution over time. Then, through a new weighting procedure that considers the participation of cohorts to the economy in each year, we estimate the impact of changes in mobility on regional economic indicators, such as income per capita, poverty, labor formality, and luminosity. Our findings show that increasing social mobility had a significant and robust effect on the development of Latin American regions.

JEL codes: D63, I24, J62, O15. ***Keywords:*** Intergenerational Mobility, Equality of Opportunity, Development, Growth, Latin America.

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1 Introduction

Equality of opportunity and social mobility are values shared by most people, and are very important policy objectives rooted in the constitution of most countries. From an empirical perspective it remains an open question whether higher social mobility is also beneficial for economic performance. Establishing the existence of a positive effect of improved social mobility on economic indicators would give an even greater justification for targeting it as policy objective, beyond the usual equity argument.

From a theoretical point of view, in a world in which abilities are transmitted perfectly from parents to children, and income inequality is just the result of returns to individual ability, redistributing opportunities to the children of less able (and hence less rich) parents at the expense of the children of more able ones might induce distortions causing a considerable efficiency loss. However, in the real world abilities are not perfectly transmitted across generations, and other factors not necessarily related to them play an important role for the distribution of resources (e.g. Bowles and Gintis, 2002; Black et al., 2020; Sacerdote, 2011). Under these conditions, creating better opportunities for the less affluent, and thus increasing social intergenerational mobility, should lead to a more efficient accumulation of human capital, reduce the *misallocation of talent*, and eventually improve the performance of the economy (e.g. Galor and Tsiddon, 1997; Galor and Moav, 2004; Mincer, 1984). Our aim in this study is to test these predictions, analyzing the role of intergenerational mobility as a driving force of economic development.[1]

Our paper makes a contribution to the literature that studies how inequality in access to resources and in opportunities may affect economic performance (e.g. Barro, 2000; Banerjee and Duflo, 2003; Voitchovsky, 2005; Brueckner et al., 2018; Van der Weide and Milanovic, 2018; Marrero and Rodríguez, 2013; Ferreira et al., 2018) providing the first large scale study on the role of social mobility for economic efficiency. Recent descriptive studies suggest a positive correlation between mobility and economic performance indicators across, as well as within, countries (e.g. Chetty et al., 2014; Güell et al., 2018; Neidhöfer et al., 2018; Aghion et al., 2019; Aydemir and Yazici, 2019). In this study we go one step further towards a causal interpretation of this relationship. We construct a

[1]The essay "The Misallocation of Talent" by Rodríguez Mora (2009) motivates the importance of the subject: "A society with low intergenerational mobility is not only unfair, it is inefficient. There is no trade-off between fairness and efficiency when increasing mobility: the more there is, the fairer and more efficient society. (...) It is hard to think about fairness, since what is fair for some is unfair for others. Efficiency is a much more powerful concept; if an allocation is inefficient, it is so for everybody. Society (as a whole) could do better."

unique data set of (sub-national) region-year observations for 10 Latin American countries, including information about the intergenerational mobility of education for people born between 1940-89, and several development indicators, such as average income, poverty rates, labor formality, and luminosity information from satellite data, covering the 1981-2018 period. To link social mobility and economic development, we implement a new methodology that connects cohort- and year-level observations by weighting the degree of mobility of a cohort based on its contribution to the overall economic performance of the respective country in each year.

Our results suggest that intergenerational mobility is a driver of economic development. We document strong variation in terms of social mobility and the level of economic development across and within Latin American countries, and find that higher intergenerational mobility is consistently associated with rising income per capita and other development indicators. These results are robust to different social mobility measures, hold when controlling for unobserved cross-regional heterogeneity and spillover effects, and do not depend on factors related to migration, educational expansions, and initial conditions. Results are also robust to the inclusion of contemporaneous income inequality, meaning that even when controlling for this factor, intergenerational mobility remains relevant for explaining economic development. An interesting picture also emerges when observing the interaction of cross-sectional income inequality and intergenerational mobility: Holding social mobility constant, the association between inequality and economic development is positive. However, the interaction between the two can be particularly detrimental for development when inequality is high and at the same time social mobility is low.

These findings have important policy implications. They suggest that there is no *equity-efficiency trade-off* regarding social mobility. Instead, our results show that improving the opportunities of disadvantaged individuals creates positive economic returns. Hence, even if interventions aimed at improving intergenerational mobility may cause inefficiencies in the short-run, cost-benefit analyses should also take their positive long-run impact on the economy into account, which may still justify their use.

This paper is organized as follows: Section 2 provides an intuitive conceptual framework about the role of opportunities and social mobility for economic development and reviews the theoretical and empirical literature. Section 3 explains the estimation strategy. Section 4 describes the data, as well as the measurement of social intergenerational mobility and economic development. Section 5

maps the geography of intergenerational mobility in Latin America. Section 6 estimates the impact of social mobility on economic development. Section 7 concludes.

2 Social Mobility and Economic Development: Conceptual Framework and Literature Review

In modern economics, the works by Becker and Tomes (1979), Becker and Tomes (1986), Loury (1981), Solon (1992), among others, set the theoretical and conceptual basis of the literature on social intergenerational mobility, modeling the mechanisms and transmission channels that explain the persistence of economic outcomes of families between generations. In these models, intergenerational persistence mainly depends on the inheritance of abilities from parents to children, as well as on private and public investments in human capital. Thus, the persistence of inequality between family lineages over time is an indicator for the opportunities of individuals to achieve economic well-being with their own effort, independent of the circumstances beyond their control, such as the family environment they were born into (Roemer, 1998). These opportunities are directly influenced by under-investments that may exist due to budget constraints, credit market imperfections, or informational asymmetries, among other factors (Heckman and Mosso, 2014).

Economic reasoning suggests that equality of opportunity and higher social mobility – understood as better opportunities for disadvantaged families to improve their socioeconomic status over the course of generations – exert a positive effect on economic performance. To display this interrelation, we embed the role of social mobility within a simple conceptual framework that visualizes the nexus between human capital and growth (e.g. Hanushek and Woessmann, 2012):

$$g = \gamma H + \kappa \Omega + u. \tag{1}$$

In this model, economic growth (g) is a function of human capital (H) and other factors (Ω). γ is expected to be positive since human capital accumulation promotes economic growth (e.g. Barro, 1991, 1997; Hanushek and Woessmann, 2008). We adopt a human capital production function of the form:

$$H = \eta(\theta_1 S + \theta_2 A) + v. \tag{2}$$

In this simple representation, the function includes the two factors schooling (S) and innate abilities (A). Hereby, schooling represents the instructional time necessary to achieve compulsory schooling, rather than accumulated years of schooling. u and v are stochastic terms that are orthogonal to the other terms in the respective equation. The allocation parameter η shows the accessibility of inputs in a society, and especially the capabilities of individuals to translate them into human capital. A higher η means that more individuals have the opportunity to accumulate human capital using their innate abilities and the skills acquired through schooling, for instance completing higher level qualifications.

Insofar as talent is randomly distributed across the population, and parents' and children's innate abilities are less than perfectly correlated, the degree of social intergenerational mobility in a society is an approximation of the allocation parameter η.[2] A higher degree of mobility shows that individuals have better opportunities to develop their potential. This, in turn, has positive repercussions on the overall accumulation and allocation of human capital, and eventually on economic growth (e.g. Galor and Tsiddon, 1997; Galor and Moav, 2004; Hassler and Rodriguez Mora, 2000; Maoz and Moav, 1999; Owen and Weil, 1998).[3]

Some studies are indicative of the potential channels driving the relationship between individual opportunities for economic success and aggregate economic performance. Bell et al. (2019) highlight the role played by the childhood-environment for innovation and progress. Bandiera et al. (2017) evaluate an intervention that enabled poor women by reducing barriers to take on better work opportunities and find that the program contributed to sustainable poverty reduction among beneficiaries while not making ineligible households to be worse off. Hsieh et al. (2019) show that improving occupational opportunities for disadvantaged groups causes a better allocation of talent and higher aggregate productivity. Hereby, barriers to forming human capital, such as credit constraints (e.g. Galor and Zeira, 1993) or under-nutrition (e.g. Dasgupta and Ray, 1986), has been argued to be particularly important. Another factor limiting individual opportunities and, hence, harming economic development has been identified to be inefficiently low *aspirations* (e.g. Genicot and Ray, 2017; La Ferrara, 2019). Individuals belonging to poor households may have lower aspirations than rich individuals, because they anticipate unfair chances in their future. This anticipation can push the poor to choose lower levels of

[2] On the role of genetics and the environment to determine long-run outcomes of children see, among others, Bowles and Gintis (2002); Black et al. (2020); Sacerdote (2011) .

[3] Analyzing the mechanisms affecting the allocation parameter η – such as territorial segregation across neighborhoods, early childhood policies, educational systems, informational barriers etc – and their relative effectiveness in improving equality of opportunity goes beyond the scope of this work. For a review of the causal evidence on the topic, see Stuhler (2018).

human capital investment, thus perpetuating their economic disadvantage. The resulting non-optimal investment decisions are detrimental to economic development.

Focusing on inequality of opportunity, rather than inequality of outcomes, may also shed some light on the so far contrasting findings on the inequality-growth nexus (e.g. Barro, 2000; Panizza, 2002; Banerjee and Duflo, 2003; Voitchovsky, 2005; Neves and Silva, 2014; Neves et al., 2016; Berg et al., 2018; Brueckner et al., 2018; Van der Weide and Milanovic, 2018). This shift of focus to opportunities, which was already proposed by Rawls (1971), Sen (1980) and Roemer (1998), among others, materialized in the central message of the World Development Report 2006 (Bourguignon et al., 2007). Still, the empirical literature on the topic is rather scant. Ferreira et al. (2018), one of the few studies testing the opportunities-growth relationship, finds evidence that suggests a negative association between inequality of opportunity and growth in a cross-country analysis, though the findings are not robust. Likewise, Marrero and Rodríguez (2013) decompose the level of total inequality in US States in inequality due to effort, and inequality due to opportunities, consistently finding that economic growth is positively related to the former, and negatively linked to the latter. Choosing social intergenerational mobility as an indicator of opportunity, some recent studies descriptively highlight a positive correlation between mobility and economic indicators, both between countries (e.g. Neidhöfer et al., 2018; Aiyar and Ebeke, 2020) and within countries across geographical areas (e.g. Chetty et al., 2014; Fan et al., 2015; Bradbury and Triest, 2016; Güell et al., 2018; Aghion et al., 2019; Aydemir and Yazici, 2019). In this study, we are the first to exhaustively analyze the relationship between social mobility and economic performance going beyond a simple description of patterns in geographical correlation.

3 Estimation Strategy

To test the hypothesis that higher intergenerational mobility has a positive impact on economic development, we translate the conceptual framework discussed in Section 2 into a linear panel regression. Hereby, the unit of analysis are subnational regions and the time dimensions is in years:

$$Y_{jct} = \alpha + \delta M_{jct} + \xi X_{jct} + \tau_{tc} + \upsilon_{jc} + \varepsilon_{jct}. \tag{3}$$

In equation (3) Y is the level of economic development, measured for instance by income per capita, of region j, which is located within the borders of country c, in year t. M is our main variable

of interest, which displays the degree of intergenerational mobility. This variable is measured as a weighted average of the degree of intergenerational mobility of people born from 1940 to 1989 living in region j, taking into account their participation in the economy in year t given their age. The exact weighting procedure is explained more exhaustively below. X is a vector of control variables for regional characteristics in t, including controls for previous economic conditions, and average characteristics of the cohorts used to estimate social mobility. The model further includes fixed effects for regions (υ) and country-specific trends (τ), while ε is the error term. In Section 4 we describe the measurement and data sources for each variable more in detail: in 4.1 we describe the data, in 4.2 the measurement of social intergenerational mobility, in 4.3 the indicators of regional development, and in 4.4 the control variables.

One fundamental challenge of linking social mobility to economic development is the temporal association of the two phenomena: while aggregate economic indicators are measured in particular years, an insightful indicator for intergenerational mobility should usually be measured for different birth cohorts. When the aim is to measure the impact of aggregate indicators - such as growth, income inequality, or public expenditures - on intergenerational mobility, one possible way is to estimate the association between the level of these aggregate outcomes that individuals experienced during their childhood and their future degree of intergenerational mobility (e.g. Mayer and Lopoo, 2008; Neidhöfer, 2019). However, this method is not feasible when the aim is to estimate the reverse, namely the impact of intergenerational mobility on aggregate economic outcomes. Indeed, most of the empirical literature overcomes this problem by taking averages of both measures across geographical areas, and hence omitting the temporal dimension. While the obtained correlations are insightful about the underlying relationship between the two variables, they cannot be interpreted as causal evidence on the impact of social mobility on economic performance.

To go one step further in the direction of a proper measurement of the effect of social mobility on economic indicators, the aim is to find a strategy that accounts for the fact that, for reasons related to the life cycle, individuals born in different cohorts are at different stages of their individual contribution to the economy in each year. Neidhöfer et al. (2018) address this issue by choosing arbitrarily chosen time lags of 30, 40, and 50 years to measure economic development when the individuals of each birth cohort were old enough to contribute substantially to the economic activity of the country. In this paper, we develop a novel weighting procedure that enables us to obtain more accurate

estimates. The procedure associates the intergenerational mobility of individuals belonging to certain birth cohorts to the economic development of their region of residence by weighting their contribution to the economy in that particular year. This contribution is defined by the wage, experience, and labor market participation associated with the stage of life in which individuals are in that year.

We compute the weights by estimating *cohort-participation profiles* for each country in each year. The weights are constructed such that they sum up to one in every year. The cohort with the highest weight is the one with the highest contribution to the economy in that particular year, while cohorts with a weight equal to zero are not participating in the labor market because they are either too young or too old. In our main specification, these cohort-participation profiles represent the share of total wages earned by all individuals belonging to the respective birth cohort on aggregate; i.e. $w_{bct} = \frac{\Omega_{bct}}{\sum_{b=1}^{B} \Omega_{bct}}$ where Ω is the sum of wages in year t of individuals residing in country c belonging to cohort b.[4] For illustrative purposes, Figure 1 shows these participation profiles for all countries in three different years.[5] We observe that most cohorts show an active contribution to the economy in each year, while younger and older individuals have the lowest weights.

Following the procedure, M in equation (3) results in a weighted average of the intergenerational mobility of people born from 1940 to 1989:

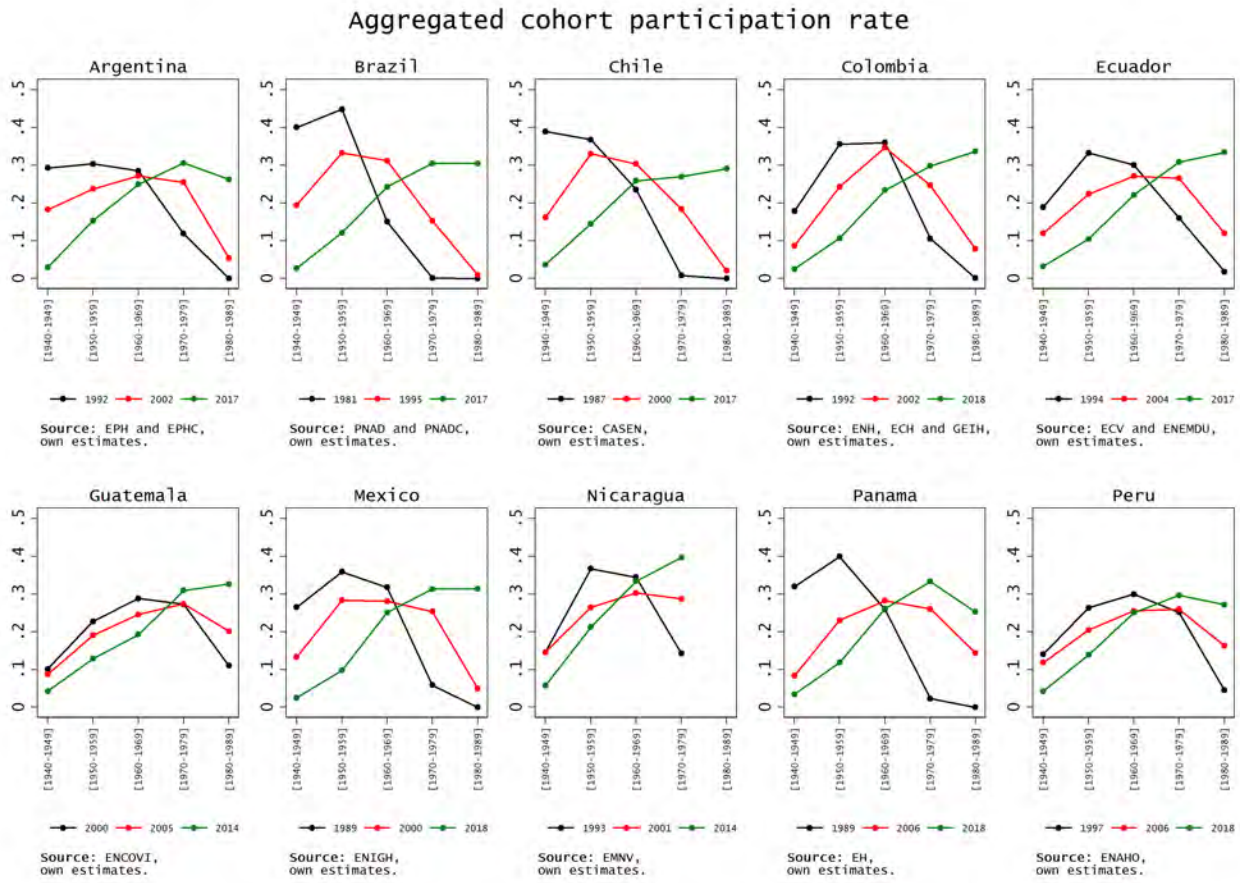
$$M_{jct} = \sum_{b=1}^{B} w_{bct} m_{bcj}. \tag{4}$$

Here, m_{bcj} is the degree of intergenerational mobility of individuals residing in j and belonging to cohort b and w_{bct} the weight measuring cohort b's participation in the economy in t. The variation across years and regions in our estimations is then given by the interaction between the degree of in-

[4]To avoid that the potential correlation between the degree of intergenerational mobility of cohorts and their labor market participation affects the construction of the weights, we define the participation profiles at the national level, rather than at the regional level, and normalize the weights to sum up to one in each year. Reassuringly, adopting this procedure we do not observe any consistent pattern of correlation between the degree of mobility of a cohort and its weight across regions and over time.

[5]To test the robustness of our results, we also compute the weights based on other definitions of cohort-participation rates: i) measured by the average wages of the cohorts w.r.t. the average national wages in each year; ii) defining a minimum share of 10% of contribution to total wages to get a non-zero weight and dividing the weights equally for every cohort satisfying this requirement; iii) defining a minimum share of 10% of contribution to total employment to get a non-zero weight and, again, dividing the weights equally for every cohort satisfying this requirement. Results of these additional exercises are included in the Online Appendix.

Figure 1: Cohort-participation profiles.



Source: National Household Surveys, own estimates.

tergenerational mobility and the cohort-participation weight.[6] To measure intergenerational mobility we adopt several indicators, which we describe below in Section 4.2.

4 Data & Measurement

4.1 Data

To obtain our estimates of social mobility and economic development, we rely on 44 nationally representative household surveys from ten Latin American countries. Hereby, our selection criteria to include a country in our sample is the availability of at least one representative survey with retrospective questions on parental education and a sufficiently large sample size to enable a subdivision of the country into subnational regions. Using these surveys, we measure intergenerational mobility of people born from 1940 to 1989.

Then, we retrieve the surveys with the highest available quality for each country in our sample – usually deriving from national statistical offices and not necessarily the same surveys used before to measure intergenerational mobility – to estimate different measures of economic development for the subnational regions of these countries from 1981 to 2018. We complement our analysis with, firstly, additional information on alternative local development indicators, such as luminosity information from satellite data and, secondly, regional control variables on demographic characteristics, and, thirdly, historical data on GDP per capita, population size, and weather conditions retrieved from different data sources.

In what follows, we briefly describe the measurement of the two main variables studied in this analysis, social intergenerational mobility and economic development, and of the control variables, as well as the data employed to obtain the estimates. A more detailed description of the data sources for each single country is included in the Supplemental Material.

[6]The applied cohort-participation profiles methodology should also be suitable to more properly evaluate the relationship between human capital, measured by education, and growth. This methodology proposed here can represent a valuable contribution to this branch of the literature, which thus far has mainly focused on contemporary (or lagged) relationships between the average education of the working age population and economic growth.

4.2 Social Mobility

The idea behind the measurement of social intergenerational mobility is to capture the likelihood of changes in the lifetime socioeconomic status of children with respect to their parents.[7] Measuring socioeconomic status through appropriate proxy measures, such as permanent income, can be challenging, mainly because of data availability (Black et al., 2011; Jäntti and Jenkins, 2015).[8] Instead, information on the completed level of education of parents and children is, firstly, more likely to be available in households surveys, secondly, highly correlated with other measures using income or occupation (Blanden, 2013), and, thirdly, less affected by measurement error (Hertz, 2008). Hence, in our analysis we focus on the education of individuals and their parents to measure intergenerational associations.

To measure m in equation (4), we estimate four different intergenerational mobility measures separately for individuals residing in different subnational region and who were born in different birth cohorts, spanning 10 year intervals: First, the slope coefficient of a linear regression of children's years of education on the years of education of their parents. Second, a standardized measure of educational persistence. Third, the probability of educational upward mobility. Fourth, the relative risk of high school completion.

The slope coefficient is the most widely used mobility index in the intergenerational mobility literature. In our application, we regress the years of education y of an individual i on the years of education of his or her parent with the highest educational degree y^p:

$$y_i = \alpha + \beta \cdot y_i^p + \vartheta x_i + \varepsilon_i. \tag{5}$$

x is a set of control variables for age and sex, and ε the error term. The regression coefficient β, the estimated value of which usually lies between zero and one, measures the degree of regression to the population mean between two generations. The higher is β, the stronger is the association between parents' and children's education, and, hence, the lower is intergenerational mobility.

This measure of intergenerational mobility has the advantage of comparability between countries, regions, and over time. However, it does not account for changes in the marginal distribution of years

[7] Intergenerational mobility measures give meaningful insights on the stratification of societies and are closely related to the notion of equality of opportunity; both empirically and conceptually (Brunori et al., 2013).

[8] For instance, measures of income mobility may suffer from so-called life cycle bias if measured on few income spells for parents and children (e.g. Nybom and Stuhler, 2017).

of education. To consider this, we estimate an indicator for the standardized persistence of education from parents to children:

$$\rho = \beta \frac{\sigma^p}{\sigma}. \tag{6}$$

Here, σ and σ^p are the standard deviations of children's and parents years of education, respectively.[9] Intuitively, both are indicators for relative mobility. While β mirrors the degree of association of one year of parental education with the education of their children, ρ measures this association in terms of one standard deviation.

We complement the analysis with two other indicators of social intergenerational mobility that instead of accounting for the entire distribution of years of education focus on an important threshold, namely high school completion. The first indicator, which we define as the *probability of upward mobility*, measures the likelihood of disadvantaged individuals - i.e. individuals whose parents both did not complete secondary education - to complete high school:

$$UM = Prob(y \geq s | y^p < s). \tag{7}$$

Here, y and y^p are defined as in the equations above and s is the amount of regular years of education attached to the completion of secondary schooling in the respective country of residence. The higher is this likelihood, the higher is (absolute) intergenerational mobility.

Building on the probability of upward mobility we estimate also our last indicator for intergenerational mobility, namely the *relative risk of high school completion:*

$$RR = \frac{Prob(y \geq s | y^p \geq s)}{Prob(y \geq s | y^p < s)}. \tag{8}$$

The relative risk of high school completion indicates how much more likely it is for the children of high-educated parents (i.e. parents with a completed secondary degree or more) to complete high school in comparison to their peers with low-educated parents. The higher RR, the lower is intergenerational mobility.

As mentioned before, to avoid co-residency bias we estimate all these indicators using surveys that include retrospective information about parental education for each respondent. Furthermore,

[9] When no control variables are included in equation (5), ρ is equivalent to Pearson's correlation coefficient between y and y^p.

since our aim is to include only individuals who are no longer enrolled in the education system, we restrict the sample to respondents that are older than 22.

Although the inclusion of retrospective questions is not common across Latin American household surveys, and we need enough large sample sizes to subdivide the sample within representative subnational regions and birth cohorts, we were able to obtain suitable data sets for 10 countries: Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, and Peru. Pooling all available survey waves we are able to estimate intergenerational mobility for five birth cohorts (1940-49, 1950-59, 1960-69, 1970-79, and 1980-89) in 52 regions. By using similar variable definitions and consistent data processing methods, the resulting statistics are comparable not only across countries and regions but also over time. Our final sample, including all countries and cohorts, comprises almost 1.2 million individuals.[10] In all our micro-level estimations of intergenerational mobility, we weight each observation by the inverse probability of selection provided by the survey, normalizing the weights over the different survey waves.

4.3 Regional Development

We collect data that enables us to estimate the level of economic development Y for each of the subnational regions in our sample. For the final analysis, we were able construct an unbalanced panel of 52 regions for the period 1981 to 2018. National household surveys are our main data source for retrieving our estimates. When measuring economic development we are not forced to use household surveys that include retrospective questions about parental education. Hence, we use all available sub-nationally representative household survey for the ten countries in our mobility sample. Since these surveys are not necessarily uniform in terms of geographical coverage and questionnaires across countries and over time, we process the surveys in order to harmonize the variable definitions, the subdivision in subnational units, and the measurement of economic development; i.e. we make the surveys comparable across countries and over time.[11]

In our baseline specification, the main indicator for the level of regional development is the average of household per capita income measured in purchase power parity (PPP). We estimate this

[10] The surveys that we use for nine of the ten countries are nationally representative for urban and rural areas. The survey that we use to measure intergenerational mobility in Argentina only includes urban areas (defined as localities with more than 2,000 inhabitants) covering 91.1% of the total Argentinian population (see Piovani and Salvia, 2018). More information on the employed surveys is included in Section A of the Online Appendix.

[11] These processed microdata is part of the Socioeconomic Database for Latin America and the Caribbean (SEDLAC), a project jointly developed by CEDLAS at the Universidad Nacional de La Plata and the World Bank. For more information, see the project website.

aggregate measure with the household surveys mentioned above, adding up all individual labor and non-labor incomes reported during the last month within a household and dividing by the number of household members. Our second indicator of economic development is the population-weighted luminosity of regions measured with satellite data on nighttime lights. This indicator has been shown in past to be a consistent proxy for economic growth (Henderson et al., 2012). We retrieve this data from Hodler and Raschky (2014). We also test our findings on a battery of further indicators for economic development: poverty, overall employment, labor formality, and access to water and electricity. All these indicators and their sources are described more exhaustively in the Online Appendix, Section B.

4.4 Control Variables

The vector X in equation (3) includes a set of control variables to avoid that the uncovered patterns of association between social mobility and economic development are spurious. The set of controls can be subdivided into three groups: i) cohort-level controls; ii) year-level controls; and iii) *cohort-specific initial conditions*.

Cohort-level controls The first group of covariates includes the cohort's average years of education and its variance, as well as the share of migrants. The average years of education are included to control for different levels of human capital accumulation, while its variance is used to control for differences in its allocation. These measures also control for the overall geographic sorting by skill level across regions (Diamond, 2016; Moretti, 2012). The share of migrants is included to control for migration from low mobility regions to high mobility regions that may bias our estimates (e.g. Ward, 2020). To test the sensitivity of our results we run all our estimations also excluding migrants and obtain consistent results.[12] All these variables are obtained from the surveys that we use to estimate intergenerational mobility, estimated at the cohort level, and weighted by the cohort-participation rate; exactly as the variable m in equation (4).

[12]For the purposes of this paper, an individual is defined a migrant if he or she was born in a different geographic area from his or her geographic area of residence (see Online Appendix, Section D). Chetty and Hendren (2018) evaluate the impacts of neighborhoods on intergenerational mobility and find heterogeneous effects depending on the age of children at the time of migration. However, we do not have information on the age of migration, which would allow us to consider this aspect in our analysis.

Year-level controls This second group of controls includes income inequality in region j and year t, measured by the Gini index of disposable household per capita income, total regional population (polynomial of the second degree), and the share of urban population. We estimate the first from household survey data and retrieve the two other from census data (their sources are described in the Online Appendix, Section C).

Cohort-specific initial conditions The inclusion of the last group of controls aims to abstract from the potential effect of so-called initial conditions, i.e. the past development level of the economy that could have had both, an effect on social mobility, as well as on subsequent economic development (e.g. Johnson and Papageorgiou, 2020). In our empirical set-up, we are mostly interested in controlling for the conditions of the economy in the years when the individuals in our social mobility sample were born and grew up. Since historical data on economic conditions is not available at the regional level for Latin America, we approximate the initial conditions for the cohorts measured in each region (i.e. between 1940 and 1989 which are the years of birth of the individuals for whom we estimate social mobility) with five different indicators.

The first indicator is an estimate for regional GDP per capita from 1940 to 1989 that we obtain following three steps: First, using the first available household survey for each country we compute the share of regional income over total national income for each sub-national region. Then, we retrieve country level data on historical per capita GDP from the Maddison Project database (Bolt and van Zanden, 2020). Finally, assuming that the regional shares computed in the first step are constant over time, we multiply these share with the historical country-level values for per capita GDP.

The second indicator for initial conditions is the child mortality rate around the year of birth of individuals. This variable controls for both, parental investments in children and the environment in which these investments take place. The idea behind this is inspired by the so-called *quantity-quality model of fertility*; i.e. the characterization of the trade-off in the choice between the number of children and the amount invested in the education of each child (Becker and Lewis, 1973). Under consideration of the quantity-quality trade-off, the degree of infant mortality mirrors the probability that individuals grow up in households with more or less children, and thus, ceteris paribus, their chances of receiving a higher or lower amount of investment in education. Negative shocks to infant mortality, for instance due to medical and pharmaceutical advances, could thus lead to an increased number of children per family, and resulting in a lower investment in the education of each child. Additionally, high levels of

infant mortality could also reflect adverse environmental conditions experienced while in-utero or in early childhood, such as natural catastrophes or epidemics, that may have a direct effect on mortality, future health, and cognitive capacities of survivors and, thus, on economic growth (e.g. Almond, 2006; Caruso and Miller, 2015).

The regional population from 1940 to 1989 is our third indicator. The inclusion of this variable is motivated by the literature relating population growth to economic growth (e.g. Headey and Hodge, 2009). The fourth and fifth indicators capture the regional weather conditions from 1940 to 1989 retrieved from National Oceanic and Atmospheric Administration, measured by the average air temperature and the average precipitation. As has been shown by past research, early-life weather conditions may have a persistent effect on future health, schooling, and socioeconomic outcomes (e.g. Maccini and Yang, 2009) as well as on economic development (e.g. Dell et al., 2012). Since all these variables are measured in the years associated with the birth cohorts, the same weighting procedure explained in Section 3 is applied to them. To account for non-linear interactions, the variables for population, temperature, and precipitation are included as a polynomial of the second degree.

5 Geography of Intergenerational Mobility in Latin America

In this section, we characterize the variation of intergenerational social mobility across the 52 subnational regions we constructed for Latin America. Our goal in this section is to provide a first detailed spatial picture of the extent to which children's education is related to their parental educational background. This analysis is relevant since it allows to identify regions with less social progress.[13]

As a first approach, Figure 2 maps the geography of social intergenerational mobility in Latin America for three cohorts. Interestingly, two main spatial patterns emerge: First, social mobility varies significantly across countries. The high levels of social mobility found in the south of South America (primarily Chile and Argentina) contrast with lower levels in the Northern part of the region, including Mexico and Central American countries. Second, there is also a substantial variation within countries. For instance, the south of Chile presents low upward mobility compared to the north of the

[13] Munoz (2021) estimates intergenerational mobility of education across Latin American provinces using cohabitation samples from census data. Since the estimates are relying on parents and children cohabiting in the same household, and hence a sample of older individuals is likely to suffer from coresidency bias (Emran et al., 2016), the analysis mostly focuses on the probability to complete primary education of younger individuals, following Alesina et al. (2021). This dimension is, actually, important for older cohorts of Latin American residents, but less relevant for more younger cohorts because of the expansion of secondary education in recent decades (e.g. Levy and Schady, 2013). Indeed, changes in returns to education just above and below high school completion are closely related to the changes in inequality experienced in the region (López-Calva and Lustig, 2010).

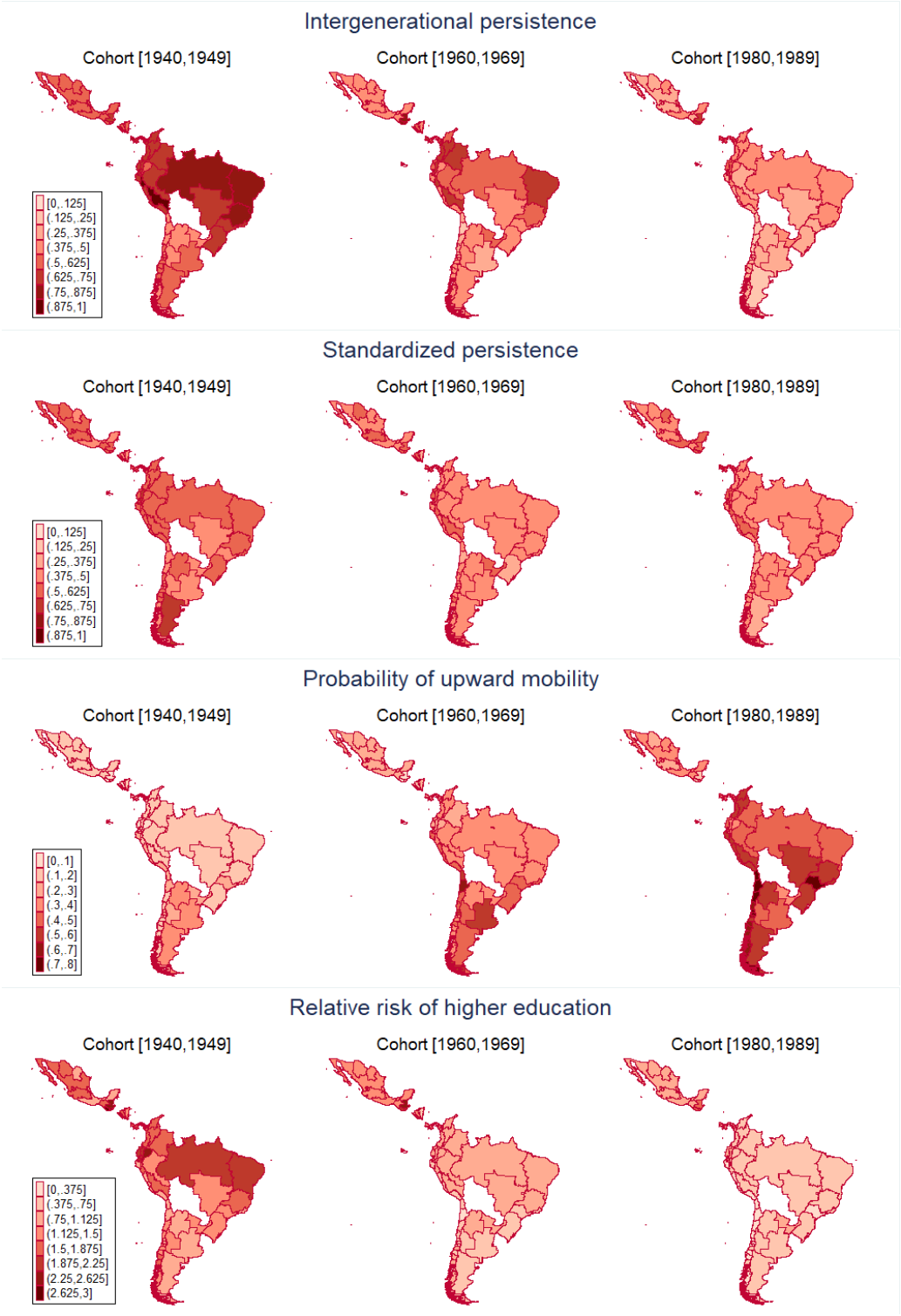
country. In turn, the northern regions of Brazil shows considerably lower levels of mobility relative to the south. These findings complement previous country-level studies that show that intergenerational mobility is rising in Latin America (e.g. Neidhöfer et al., 2018). We provide evidence suggesting that this trend reached almost every sub-national region, but with a high degree of heterogeneity across and within countries.[14]

To emphasize the relevance of within-country variation, Figure 3 shows the distribution of different measures of social mobility for each country and its regions. The country-level values can reasonably give a general picture of social mobility in Latin America. However, most of the country-levels estimates are not a sufficient summary of the heterogeneity within countries. For instance, Ecuador, Nicaragua, and Panama have levels of intergenerational persistence above the Latin American average (i.e., lower social mobility), while many of their sub-regions reach substantially lower levels, comparable to the most socially mobile countries (Argentina and Chile). This heterogeneity is also visible in Figure 4, which shows the 10% regions with the highest and lowest levels of intergenerational mobility.

Figure 5 plots the evolution of social mobility measures for regional level (grey) and country-level (black) estimates by comparing individuals belonging to the first two cohorts of our analysis (1940-1949) with people born in the last two (1980-1989). As is evident, Latin Americans benefited differently from the development of social mobility over time, even considering areas within the same country. Estimates over the 45-degree line imply that intergenerational mobility did not change over the time period. On the other hand, estimates reveal improvements in social mobility when they are on the right of the 45-degree line for the intergenerational persistence, the standardized persistence, and the risk ratio measures, and on the left for the probability of upward mobility. In general, intergenerational mobility is rising in our sample of Latin American countries both at regional and national levels. For instance, while in all countries the chance of upward mobility for people born 1940-49 with low-educated parents is less than 50%, the chances of people born 1980-89 in many regions are significantly higher. However, substantial heterogeneity remains regarding both the

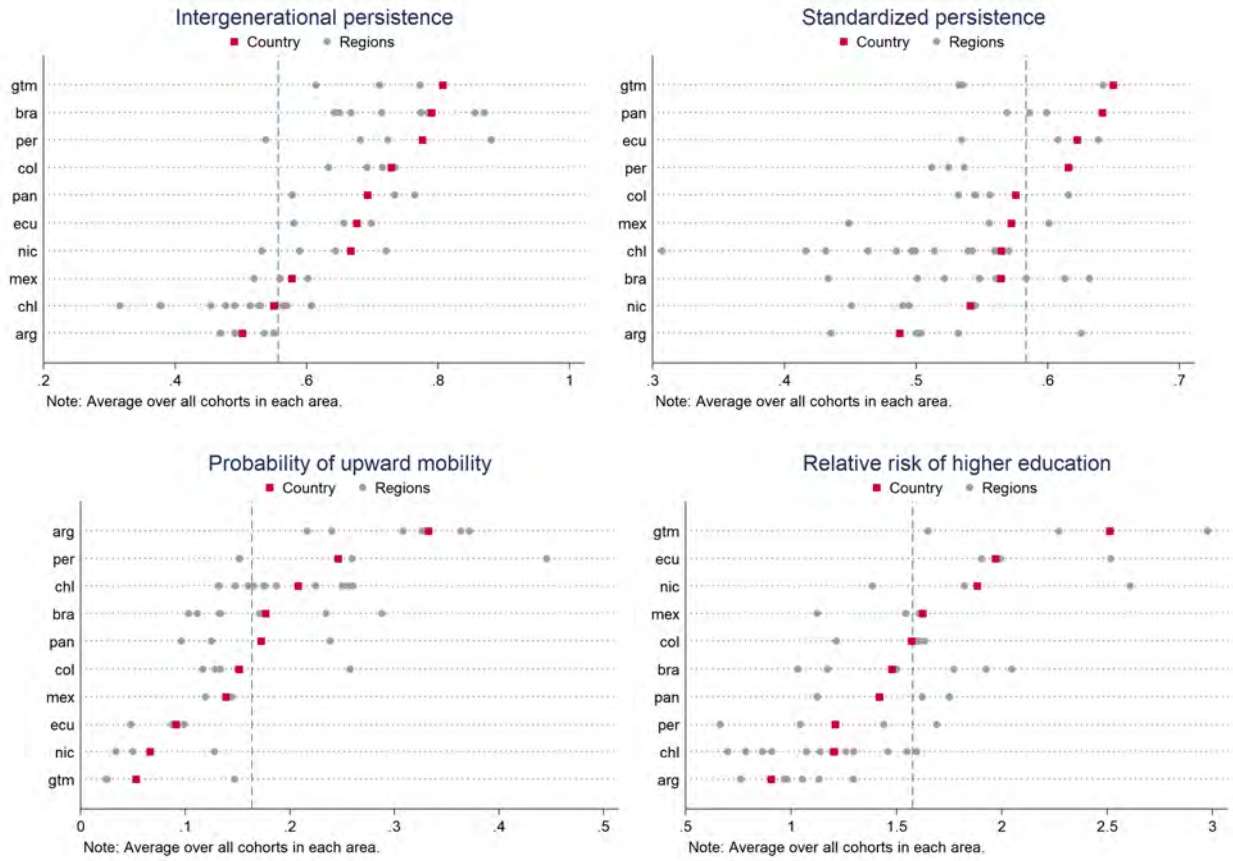
[14]Note that these estimates are merely descriptive and do not consider, so far, the role of migration to shape intergenerational mobility patterns. The level of intergenerational mobility of a region is measured on a sample including all residents of that region. Since the intention of this part of the analysis is to give a descriptive overall picture on the geography of intergenerational mobility in Latin America we abstain from excluding migrants here. However, when measuring the impact of intergenerational mobility on economic development in the next Sections we do take this important aspect into account, including appropriate control variables and testing the robustness of our results.

Figure 2: The geography of social mobility levels in Latin America.



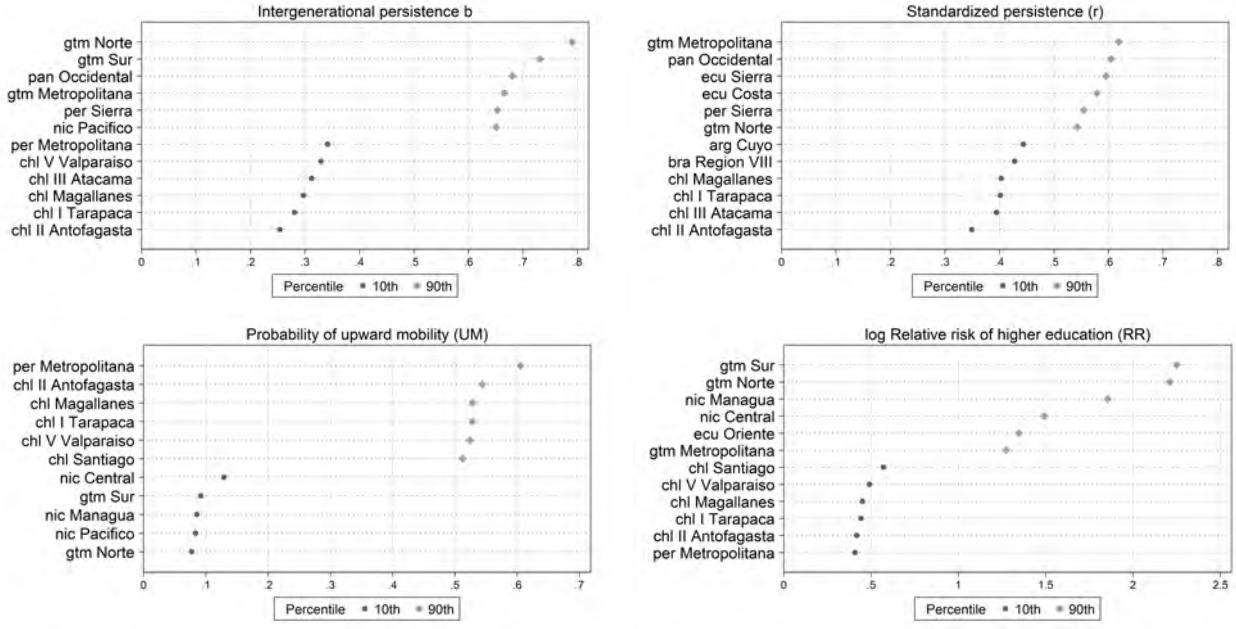
Source: National Household Surveys, own estimates.

Figure 3: Comparison of social mobility at national and sub-national level.



Source: National Household Surveys, own estimates.

Figure 4: Rankings of social mobility across Latin American sub-national regions.



Source: National Household Surveys, own estimates.

degree of mobility as well as its evolution over time. In particular, the dispersion of social mobility across regions for younger cohorts is much less prominent than it was in past.

6 The Impact of Social Mobility on Economic Development

6.1 Baseline Results

In this section we report the results of our empirical analysis to test the relationship between social mobility and economic development.[15] As a first approximation, Figure 6 plots the averages over the entire time period of all four measures of social intergenerational mobility described in Section 4.2 and *log* average household per-capita income. This first stylized analysis shows a clear and robust positive (negative) correlation between intergenerational mobility (persistence) and economic development, both across countries as well as across regions.

Table 1 presents the results of estimating equation (3) using the slope coefficient to measure intergenerational mobility (M) and average household per-capita income as indicator of economic development (Y). Recall that the slope coefficient is a measure of persistence; it shows the degree of association of one year of parental schooling with the years of schooling of their children. The higher this coefficient is, the lower is intergenerational mobility. Hence, a negative regression coefficient of M in Table 1 indicates higher intergenerational persistence (i.e. lower intergenerational mobility) is associated with lower average per-capita income.[16] To allow a more straightforward interpretation of the coefficients, all variables are included as logarithms in the estimations. Robust standard errors are obtained clustering at the country-year level to account for serial correlation of the error term within countries.[17] The significance of the point estimates is consistent with the main analysis if we cluster standard errors by countries, or regions.

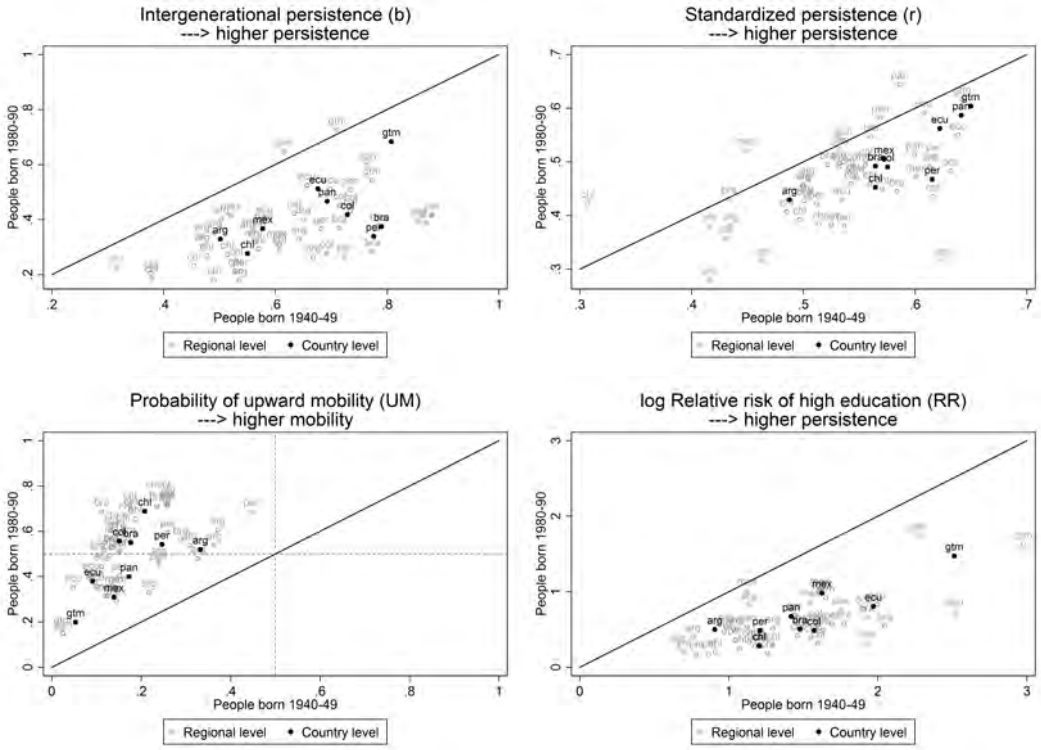
We gradually include the control variables described in Section 4.4 and observe that, in all estimations, the coefficient of M measured by the slope coefficient is negative and highly significant. These results show that social mobility is consistently associated with economic development even when controlling for potential mediators, such as cross-sectional inequality, share of migrants, average edu-

[15] Throughout this section, we present the results weighting social mobility measures using the aggregated cohort-participation profiles. All the results presented here are robust to the utilization of the other alternatives of cohort weights described in Section 3. These additional results are shown in Section E of the Online Appendix.

[16] The same applies for the standardized persistence (ρ) and the relative risk of high school completion (RR). For the probability of upward mobility (UM) a positive coefficient indicates that higher mobility is associated with economic development.

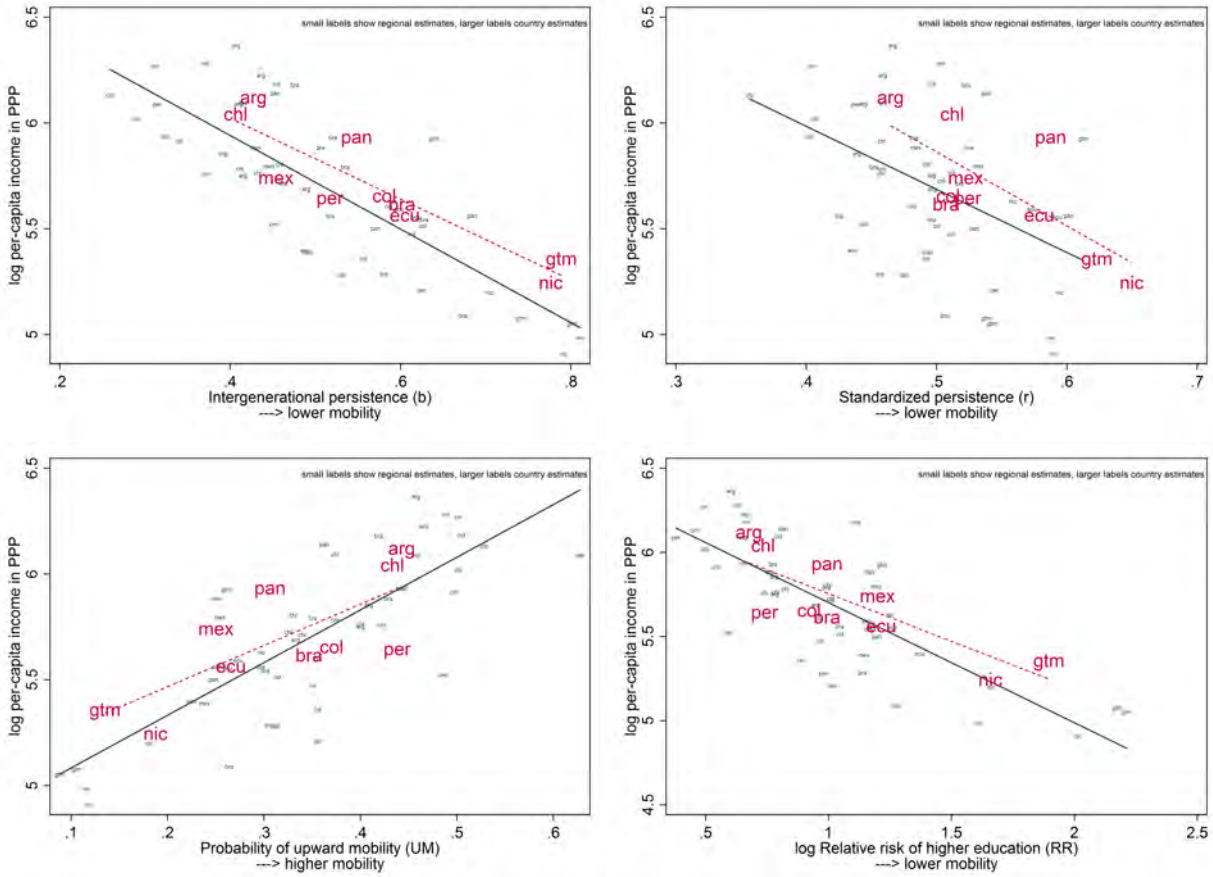
[17] Results with bootstrapped standard errors are included in the Online Appendix.

Figure 5: Evolution of social mobility in Latin American regions.



Source: National Household Surveys, own estimates.

Figure 6: Social mobility and economic development. Unconditional relationship.



Source: National Household Surveys, own estimates.

Table 1: Estimates on social mobility and economic development. Intergenerational persistence β

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
M (w)	-1.268***	-1.292***	-1.506***	-2.012***	-2.032***	-1.967***	-1.593***	-2.645***
	(0.0638)	(0.230)	(0.243)	(0.268)	(0.216)	(0.228)	(0.305)	(0.303)
M (w) × Inequality (Gini)								-1.409***
								(0.192)
Year-level Controls								
Inequality (Gini)			0.356**	0.456***	0.498***	0.512***	0.746***	-0.453***
			(0.158)	(0.156)	(0.167)	(0.155)	(0.0823)	(0.165)
Urban Population			0.187	-0.0155	-0.131	-0.0588	-0.137	-0.230***
			(0.131)	(0.130)	(0.136)	(0.130)	(0.0937)	(0.0803)
Population			-0.918	-0.329	-0.0659	0.827	0.103	-0.0220
			(0.647)	(0.528)	(0.689)	(0.635)	(0.464)	(0.424)
Population × Population			0.0270	0.00439	-0.00663	-0.0370	-0.0138	-0.00669
			(0.0226)	(0.0187)	(0.0244)	(0.0226)	(0.0161)	(0.0148)
Cohort-level Controls								
Migrant share (w)				0.633***	0.680***	0.964***	0.0583	0.0528
				(0.160)	(0.159)	(0.172)	(0.161)	(0.148)
Average years of education (w)				0.528*	0.704**	-0.744**	0.979***	1.005***
				(0.295)	(0.274)	(0.288)	(0.288)	(0.299)
Variance of education (w)				0.350*	0.402**	1.079***	-0.140	-0.221
				(0.178)	(0.194)	(0.180)	(0.218)	(0.228)
Initial conditions								
GDP p.c. 1940-89 (w)					0.131**	0.0565	-0.127**	-0.0953**
					(0.0526)	(0.0481)	(0.0541)	(0.0478)
Child mortality 1940-89 (w)					0.160	0.189	-0.599***	-0.689***
					(0.180)	(0.191)	(0.134)	(0.125)
Population 1940-89 (w)					0.733**	1.284***	0.357	0.767**
					(0.346)	(0.339)	(0.298)	(0.305)
Population 1940-89 (w) × Population 1940-89 (w)					-0.0264**	-0.0408***	-0.0170*	-0.0299***
					(0.0114)	(0.0109)	(0.0102)	(0.0102)
Temperature 1940-89 (w)					0.259	0.199	1.051***	1.124***
					(0.336)	(0.295)	(0.202)	(0.204)
Temperature 1940-89 (w) × Temperature 1940-89 (w)					-0.0195**	-0.0162**	-0.0351***	-0.0326***
					(0.00944)	(0.00819)	(0.00529)	(0.00523)
Precipitation 1940-89 (w)					-0.219***	-0.173***	-0.0332	0.0119
					(0.0577)	(0.0484)	(0.0406)	(0.0366)
Precipitation 1940-89 (w) × Precipitation 1940-89 (w)					0.00226	0.00155	-0.00427***	-0.00427***
					(0.00184)	(0.00158)	(0.00141)	(0.00126)
Country F.E.	X						X	X
Time F.E.	X	X	X	X	X	X	X	X
Region F.E.		X	X	X	X	X	X	X
Spillover effects						X	X	X
Observations	1368	1368	1368	1368	1368	1368	1368	1368
Adjusted R^2	0.740	0.922	0.924	0.928	0.934	0.939	0.979	0.981

Notes: Dependent variable is the log per capita income of a region (between 1981 and 2018). M (w) is the weighted intergenerational persistence (measured by the slope coefficient) of people born between 1940 and 1989. Spillover effects are controlled including the average degree of intergenerational persistence in year t of all other regions $-j$ in the country (i.e. region j is excluded to estimate this average). Columns (7) and (8) include the interaction between country and time fixed effects. For a detailed description of the data and all variables included in the regressions see Section 4. *Source*: National Household Surveys, own estimates.

cation, and initial conditions. The results also hold when controlling for unobserved heterogeneity by including region and time fixed effects, spillover effects between regions in the same country, and for country-specific time trends.[18] On average, a 10% increase in intergenerational mobility, measured by the slope coefficient, raises income per capita by 17%.[19] To give benchmarks for this estimate, intergenerational mobility of education measured by the slope coefficient rose in Latin America, on average, by 4% from one four-year-cohort to the next between 1940 and 1991, and by 12% for people born at the end of the 70s with respect to people born at the beginning of the 60s.[20]

Although the exact identification of the effect of improving social mobility on economic performance is empirically challenging, and we cannot completely exclude that other sources of unobserved heterogeneity not considered here may bias our results, these new estimates allow us to make an important step toward the identification of a causal impact. First, the results presented above show that the positive and significant association between social mobility and economic development is not explained by confounding factors such as migration, human capital accumulation, contemporaneous income inequality, and the initial conditions of the economy (i.e. the persistent effect of the economic development of the region between 1940 and 1989, which represents the circumstances faced during the time span when the individuals in our sample were born, on present economic development). Second, since we are performing the analysis within countries across regions, and including region and time fixed effects, and even country-specific time trends, our estimates account for unobserved heterogeneity that could drive the results, for instance due to the role of culture and institutions as drivers of economic development. Third, given the structure of our data and the construction of our variable for social mobility through the weighting procedure explained in Section 3, the association that we measure relates past mobility with future economic development. Due to the cohort-participation profiles methodology applied, at the point in time when economic development is measured the individuals for whom mobility is estimated already completed their educational career. In addition, we control for the past level of development – i.e. the *cohort-specific initial conditions* of the economy. Hence, the estimated effect cannot be affected by a feedback effect resulting in reverse causality. Furthermore,

[18] Spillover effects are controlled by including the average degree of intergenerational persistence in year t of all other regions $-j$ in the country (i.e. region j is excluded to estimate this average), while country-specific trends by including the interaction between country and time fixed effects.

[19] The results obtained using the other measures of mobility described in Section 4.2 confirm these findings. The average effect over all mobility measures is around 12%. All additional results tables, including several robustness checks, can be found in the Online Appendix, Section E.

[20] These estimates are obtained from the Mobility-Latam Data at https://mobilitylatam.website (see Neidhöfer et al., 2018).

all results hold likewise considering the degree of intergenerational mobility of men and women separately, and excluding migrants; and the significance of the correlation is robust to the consideration of different measures of intergenerational mobility.

Among the covariates included in the models, income inequality deserves a special mention. Its coefficient in most specifications shows that, controlling for the degree of intergenerational mobility, inequality is positively associated with economic development. However, the interaction between social mobility and cross-sectional income inequality in column (8) has a negative sign, meaning that low social mobility is particularly detrimental when income inequality is on high levels.

6.2 Different Dimensions of Development

We test if the positive impact of social mobility on income per capita also translates to other dimensions of economic development. Table 2 presents the estimated coefficient of social mobility M in equation (3) for different variables as indicators for economic development Y. The estimations include the full set of control variables described in Section 4.4, region and country-time fixed effects, and spillover effects. The results show that the positive relationship between social mobility and economic development is robust to considering different indicators, namely the *log* of average nighttime lights per pixel (i.e. luminosity), poverty (headcount ratio at 1USD a day), total employment, labor formality, and houses with access to water and electricity. A 10% decrease in the slope coefficient (i.e. an increase in social intergenerational mobility) is associated with a 8% stronger luminosity, 25% less poverty, 8% more employment, 5% more formality, and 8% and 2% higher share of houses with access to water and electricity, respectively.[21]

6.3 Accumulation vs. Allocation

After having shown that social mobility is consistently and positively associated with economic development, and that this relationship is robust, we further test whether the main driver of this relationship is the accumulation of human capital or its allocation. Generally, a stronger accumulation of human capital and lower social mobility could coexist, for instance when it is mostly the children of high-educated parents who benefit from educational expansions, and correspondingly improve their level of education and earnings capacities. In the regressions presented so far, we controlled for the average years of education to avoid that our estimates are biased and capture the "trickle-down-effect"

[21] The coefficient of the last parameter is not statistically significant.

Table 2: Estimates on social mobility and economic development. Intergenerational persistence β

	Luminosity	Poverty	Employment	Formality	Water	Electricity
M (w)	-0.817***	2.518**	-0.795***	-0.525**	-0.786***	-0.192
	(0.132)	(0.997)	(0.105)	(0.206)	(0.172)	(0.156)
Region and Country-Time F.E.	X	X	X	X	X	X
Year level controls	X	X	X	X	X	X
Cohort level controls	X	X	X	X	X	X
Initial conditions	X	X	X	X	X	X
Spillover effects	X	X	X	X	X	X
Observations	999	1368	1368	1223	1278	1128

Notes: Dependent variable is indicated in the column-title. M (w) is the weighted intergenerational persistence (measured by the slope coefficient) of people born between 1940 and 1989. For a detailed description of data and variables see Section 4. *Source*: National Household Surveys, own estimates.

Table 3: Estimates on social mobility and economic development. Allocation vs. accumulation of human capital and economic development

	(1)	(2)	(3)	(4)	(5)
Upward Mobility (w)	1.204***			1.122***	1.201***
	(0.0948)			(0.108)	(0.0963)
Top Persistence (w)		0.614**	0.543**	0.0374	0.0252
		(0.248)	(0.247)	(0.233)	(0.231)
Average years of education (w)			1.522***	0.573**	
			(0.219)	(0.230)	
Region and Country-Time FE	Yes	Yes	Yes	Yes	Yes
Observations	1368	1368	1368	1368	1368

Notes: Dependent variable is the log per capita income of a region (between 1981 and 2018). Estimations include the full set of control variables. For a detailed description of data and variables see Section 4. *Source*: National Household Surveys, own estimates.

of this type of accumulation (at the top of the distribution) on economic development, instead of the impact of social mobility and equality of opportunity. In this section, we further test this assumption including both the degree of upward mobility from the bottom, and the degree of persistence at the top. The results of this exercise are shown in Table 3.

The regression estimates in column (1) of Table 3 are obtained including the full set of control variables with the exception of average years of education. The coefficient of upward mobility, i.e. the likelihood of completing secondary education for the children of low-educated parents, is positively and significantly associated with economic development. The same also applies to the degree of top persistence, i.e. the likelihood of completing secondary education for the children of high-educated parents, which is highly correlated with the degree of upward mobility from the bottom since secondary school expansions benefited most of the population in Latin American countries. However, when including average years of education and the degree of upward mobility in column (4) and (5), the coefficient of top persistence becomes very small in size and statistically indistinguishable from zero. The only variable which is consistently, significantly, and substantially associated with economic development is the level of upward mobility.

These estimates confirm that it is not just the overall accumulation of human capital that is positively affecting economic development, but instead in which part of the distribution this accumulation takes place. A higher human capital accumulation for children from disadvantaged families increases equality of opportunity and leads to a more efficient allocation of talent, and hence to improved aggregate economic performance, while a higher accumulation taking place only in advantaged families may have no direct effect on development.

7 Conclusions

In this paper, we explored the relationship between social intergenerational mobility and economic development constructing a new panel data set including 52 regions of 10 Latin American countries. For these regions, we estimate the degree of intergenerational mobility of people born between 1940 and 1989, and aggregate measures of economic development from 1981 to 2018. These are linked using a new weighting procedure that we develop to account for the relative participation of the cohorts in the economy in every year. Our results show a positive, significant, and robust impact of increasing social mobility on the economic development of Latin American regions.

To the best of our knowledge, this paper represents the first large scale study on the role of social mobility on economic development and contributes to our understanding of the nexus between inequality and economic growth (e.g. Barro, 2000; Banerjee and Duflo, 2003; Voitchovsky, 2005; Brueckner et al., 2018; Van der Weide and Milanovic, 2018; Marrero and Rodríguez, 2013; Ferreira et al., 2018). Our findings suggest the non-existence of the equity-efficiency trade-off regarding social mobility. Conversely, they suggest that improving equality of opportunities generates positive economic returns. Our analysis provides evidence for the robustness of this positive impact and shows that it is not driven by confounders such as migration, human capital accumulation, and initial development conditions. Although a clear causal identification of the relationship is challenging, our empirical set-up makes a decisive step in this direction.

Hence, these results are also relevant for the evaluation of the effectiveness of market interventions. Arguably, interventions aimed at improving equality of opportunities may create distortion and, thus, cause inefficiency in the short-run. However, if these interventions are indeed able to contribute to better opportunities and less misallocation of talent, they should simultaneously contribute to increased efficiency in the long run. Consequently, both effects could possibly outweigh each other and change the terms of the trade-off. For the sake of sustainable policy decisions, these long-run considerations should be taken into account to evaluate the effectiveness of policy measures in the future.

Finally, our analysis also contributes to the literature on the geography of intergenerational mobility (e.g. Alesina et al., 2021; Chetty et al., 2014; Corak, 2020; Güell et al., 2018) by providing first geographical trends for 52 sub-national regions in Latin America. Our findings show that there is a considerable variation among sub-national regions in both, intergenerational mobility and economic development, even within countries. Since previous country-level estimations showed that Latin America is a region with strong intergenerational persistence (e.g. Torche, 2014; Neidhöfer et al., 2018), these new findings contribute to the overall picture that country-wide patterns hide a considerable heterogeneity within countries.

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