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Intergenerational Mobility around the World

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Abstract

Using individual data from over 400 surveys, this paper compiles a global database of intergenerational mobility in education for 153 countries covering 97 percent of the world's population. For 87 percent of the world's population, it provides trends in intergenerational mobility for individuals born between 1950 to 1989. The findings show that absolute mobility in education—the share of respondents that obtains higher levels of education than their parents—is higher in the developed world despite the higher levels of parental educational attainment. Relative mobility—measuring the degree of independence between parent and child years of schooling—is also found to be greater in the developed world. Together, these findings point to severe challenges in intergenerational mobility in the poorest parts of the world. Beyond national income levels, the paper explores the correlation between intergenerational mobility and a variety of country characteristics. Countries with higher rates of mobility have (i) higher tax revenues and rates of government expenditures, especially on education; (ii) better child health indicators (less stunting and lower infant mortality); (iii) higher school quality (more teachers per pupil and fewer school dropouts); and (iv) less residential segregation.

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Intergenerational Mobility around the World*

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1. Introduction

A society with high intergenerational mobility (IGM) is one where an individual's socioeconomic success is less dependent on the socioeconomic success of his or her parents. Low mobility can lead to unrealized human potential and a misallocation of resources as talented individuals from disadvantaged families are excluded from opportunities. Policies promoting higher intergenerational mobility are likely to promote growth that is more inclusive in nature. Theoretically, higher levels of IGM have been shown to enhance both efficiency and equity by strengthening the correlation between education and ability (e.g. Glomm and Ravikumar, 1992; Maoz and Moav, 1999; Lloyd-Ellis, 2000).

Historically, the United States is viewed as the land of opportunity. The American dream embodies the belief in opportunity for each according to ability and effort. Chetty et al. (2014) show that the United States is better described by a collection of smaller societies.[1] In some parts of the country, mobility is on par with some of the most mobile countries in Europe, while in other parts, children struggle to escape poverty when born into it. Chetty et al. (2014) also find that areas with relatively high rates of mobility tend to be ones that are less residentially segregated (i.e. the extent to which households from different socio-economic backgrounds and different races live in separate neighborhoods), have lower inequality, higher quality public school systems, stronger social networks, and stronger family structures. Corak (2021) and Connolly et al. (2021) show that similar patterns also prevail in Canada.

Looking beyond the United States and Canada, where are the lands of opportunity globally, i.e. what would a global map of social mobility look like? If the geographic patterns observed in the United States are also observed across countries, then the least mobile countries are more likely to be found in the developing world. If there is indeed a socio-economic mobility gap between the developing world and the developed world, is that gap closing over time?

There is considerable empirical evidence on intergenerational mobility in the developed world (see Black and Devereux (2011) and Corak (2013) for reviews of the literature). Most of the empirical studies focus on the United States, Canada and select countries from Europe, including the United Kingdom, France, Germany, and the Scandinavian countries. Evidence for the developing world is scarcer. It includes a study by Alesina et al. (2021) on Africa, a study by Asher et al. (2018) on India, and a cross-country study on Latin America by Neidhöfer et al. (2018). The largest cross-country study on intergenerational mobility prior to this paper is Hertz et al. (2007) who provide estimates for 42 countries.

[1] Chetty et al. (2014) estimate intergenerational income mobility at the municipality level for the United States. Several studies have followed this approach and estimated intergenerational mobility at local administrative levels for large countries. Corak (2021) and Connolly et al. (2021) obtain similarly disaggregated estimates of income mobility for Canada. Asher et al. (2018) and Alesina et al. (2021) are the first to attempt this for the developing world by providing highly disaggregated estimates of intergenerational education mobility for India and Africa, respectively.

The Global Database on Intergenerational Mobility (GDIM) compiled by this study significantly expands the evidence base on intergenerational mobility in education by providing estimates for 153 countries representing about 97 percent of the world's population born in the 1980s.[2] For 114 countries, or 87 percent of the world's population, estimates of mobility span four decades: from those born in the 1950s to those born in the 1980s. The 1980s cohort, those born between January 1, 1980 and December 31, of 1989, represent the youngest generation of adults who would have completed their education at the time of data collection (as most survey data used are from 2010 or later). For each country we identified the survey data best suited for the estimation of intergenerational mobility in education.

We consider two concepts of IGM. Absolute mobility measures the share of individuals who surpass the education of their parents. Relative mobility captures the degree to which individual socioeconomic success is independent of the socioeconomic success of one's parents. We will focus on mobility in education for several reasons.[3] Firstly, human capital is a key aspect of economic well-being. Secondly, intergenerational data on education is more widely available than on income. Thirdly, the estimation of educational mobility involves fewer methodological challenges. Unlike income, the level of education, once acquired, does not vary across an individual's lifecycle. Fourthly, individuals can report their parents' education level with a high degree of precision, whereas the same is not true for income, making it possible to study mobility in education without panel data. A limitation of focusing on education mobility is that it does not capture distortions in the labor market, such as the extent to which access to good jobs is contingent on the socioeconomic background one is born into.

Our database makes it possible, for the first time, to paint a truly global picture of intergenerational mobility. This in turn allows us to test whether insights from the existing literature, which has mostly focused on developed countries, generalize to developing countries. We test two main hypotheses: First, whether absolute mobility is lower in the developed world where education levels are higher on average, making it harder for the next generation to surpass the education levels of their parents. Second, whether relative mobility increases with national income levels. Richer countries have the necessary resources to fund public interventions that compensate for private disadvantages (e.g. provide high quality public education for children born into disadvantaged backgrounds). This would be consistent with the findings of Chetty et al. (2014), who show that lower levels of intergenerational mobility are more likely to be found in the lagging areas of the United States.

[2] In parallel to our study, Brunori et al. (2021) developed the "Equal Chances" database that includes estimates of intergenerational income mobility for 27 countries as well as estimates of inequality of opportunity for 47 countries. Our estimates of intergenerational mobility in education for 153 countries are also included in this database.

[3] Alesina et al. (2021), Neidhöfer et al. (2018), Asher et al. (2018), and Hertz et al. (2007) similarly focus on education, arguably for the same reasons.

We obtain the following empirical findings. First, for the youngest cohorts in our sample, both absolute and relative mobility in education are estimated to be lower on average in the developing world than in the developed world. Second, we find evidence against both hypotheses in the relationship between mobility and national income across the wide range of countries. While our observations are consistent with the existing literature that focuses primarily on the high-income world, expanding the coverage of the low-income world reveals that the relationship between IGM and national income is non-monotonic.

Absolute mobility is found to be lowest in the world's poorest countries and the world's richest countries, but arguably for different reasons. In the poorest countries, the scope for surpassing parents is greatest but the capacity to educate children is lowest. By contrast, in the world's richest countries, the capacity to educate children is greatest but the scope to surpass parents is lowest. Jointly, these findings produce an *inverse* U-pattern between absolute mobility and national income.

Relative mobility on the other hand is found to be highest in the richest and the poorest nations, resulting in a *regular* U-pattern between relative mobility and national income. We propose a candidate explanation for this stylized fact. In countries where a large share of the population lives in poverty and where most parents have no education, parental education will be a weak predictor of child education as there is little variation between parents. As countries develop, the gaps between poor, middle-class, and better-off parents become more pronounced. In the absence of public interventions, it will make a big difference whether one is born into a poor, middle-class, or upper-class family, such that relative mobility will start to decline. As countries further increase their national income and adopt public policies aimed at leveling the playing field, relative intergenerational mobility will increase. We observe a positive correlation between relative mobility and public spending, particularly public spending on education, while controlling for national income, which is consistent with this rationale.

Beyond government expenditures, we identify four types of country characteristics that are correlated with intergenerational mobility. First, child health: countries where children are in good health (i.e. low stunting rates, low infant mortality rates) on average report higher levels of mobility. Second, proxies for school quality: countries with a larger number of teachers per pupil and lower drop-out rates also have higher rates of mobility. Third, variables that are indicative of the reach of public interventions: countries with higher mobility are more likely to be small in terms of population and/or land area and tend to be more urbanized. Fourth, measures of residential segregation: lower rates of intergenerational mobility are more likely to be found in countries that are more residentially segregated.

When we disaggregate intergenerational mobility by gender, we find that boys in the high-income world and developing world have on average similar chances of surpassing their parents. By contrast, girls in the high-income world and developing world face starkly different odds of surpassing their parents. If current time-trends prevail however, girls are on track for surpassing

boys in terms of absolute mobility in the developing world in the coming decade(s). In the high-income world girls have already overtaken boys on average in terms of absolute mobility. We do not observe notable gender gaps in relative mobility.

The remainder of the paper is organized as follows. Section 2 describes our methodology and presents our measures of intergenerational mobility. Section 3 describes the Global Database of Intergenerational Mobility. Section 4 presents the trends and patterns in intergenerational mobility over time, across the world, and by gender. Section 5 analyzes correlates with intergenerational mobility. Section 6 presents robustness checks while Section 7 concludes.

2. Intergenerational mobility in education

Intergenerational mobility is interpreted here in two distinct but related ways, which we will refer to as absolute mobility and relative mobility. What we term absolute versus relative mobility may differ slightly from how these terms are used in other studies, in part because this terminology has been used loosely (for a recent review of different measures see Jäntti and Jenkins (2015) and Fields and Ok (1996, 1999)). Table 1 summarizes the measures of absolute and relative mobility used in this paper, which will be explained in more detail in this section.

The estimation of intergenerational mobility between parents and children requires specifying which parents and children one is referring to. Unless otherwise specified, all children are considered in the estimation of mobility. Whenever parental education is referred to, the maximum education attained by the parents is used.[4] Our motivation for using maximum parental education is three-fold. Firstly, it provides a more accurate measure of the parental human capital that can be transferred to the parents' children. Secondly, it arguably provides a more accurate proxy of the household resources that can be invested in the human capital growth of the children. Thirdly, maximum parental education is probably a more stable measure to the extent that it is more robust to the expansion of female educational attainment and the increasing correlation of educational attainments between parents (i.e. assortative mating). Using maximum parental education produces lower levels of absolute mobility such that our approach may yield conservative estimates.[5]

[4] Estimates using fathers and mothers separately, as well as estimates based on parents' average years of schooling are available in the online version of the Global Database of Intergenerational Mobility. For three countries, information on fathers' years of schooling but not on mothers' years of schooling is available (Benin, Democratic Republic of Congo, and Chad). In these cases, it is assumed that the maximum value of parental years of schooling is equivalent to the father's years of schooling.

[5] The existing literature of earnings mobility tends to focus on father-son mobility in large part because of the low levels of female labor force participation observed during the periods when this literature originated, and to avoid the associated selection bias. Since then female employment has increased substantially, which has weakened the

Table 1: Measures of absolute and relative mobility used in this paper

Absolute mobility			
Name	*Description*	*Formula*	*Treatment*
CAT	Share of respondents with a higher educational category than both parents conditional on neither parent having tertiary education.	$P(c_{child} > c_{parent} \mid c_{parent} < tertiary)$	Main measure
YOS	Share of respondents with more years of schooling than both of their parent's conditional on parents not having the maximum years of schooling observed in the sample.	$P(y_{child} > y_{parent} \mid y_{parent} < \max in\ sample)$	Robustness section
DIF	Mean difference in years of schooling conditional on parents not having tertiary.	$E(y_{child} - y_{parent} \mid c_{parent} < tertiary)$	Appendix
MIX	Share of respondents with strictly higher educational category than parents if parents do not have tertiary, or with tertiary education if either parent has tertiary.	$P(c_{child} > c_{parent}\ or\ c_{child} = tertiary)$	Appendix
Relative mobility			
Name	*Description*	*Formula*	*Treatment*
1-COR	1 minus the correlation coefficient between respondent and parents' years of schooling.	$1-\rho, \quad \rho = cor(y_{child}, y_{parent})$	Main measure
1-BETA	1 minus the coefficient from regressing respondents' years of schooling on parents' years of schooling.	$1-\beta, \quad from\ y_{child} = \alpha + \beta * y_{parent} + \varepsilon$	Robustness section
MU050	The expected educational rank of respondents born to parents in the bottom half.	$E(rank_{child} \mid rank_{parent} < 50)$	Appendix
BHQ4	The probability that respondents born in the bottom half reaches the top quarter.	$P(rank_{child} > 75 \mid rank_{parent} < 50)$	Appendix

Note: c refers to the highest educational category completed of the following five categories, (1) less than primary, (2) primary, (3) lower secondary, (4) upper secondary, (5) tertiary. *y* refers to years of schooling completed.

2.1. Absolute mobility

Absolute mobility will measure the extent to which living standards of a given generation are higher than that of their parents. We measure absolute mobility (denoted *CAT*) by the share of respondents that have attained a higher educational category than their parents, conditional on the parents not having obtained tertiary education, such that all included individuals have a chance of surpassing their parents. For this measure, we categorize individuals and parents according to their highest educational attainment in the following categories (see Section 3 for more details): (i) less than primary, (ii) primary, (iii) lower-secondary, (iv) upper-secondary, or (v) tertiary. The motivation for using these educational categories is two-fold. First, it improves cross-country comparability as the education data in several countries do not disaggregate beyond these five categories. This avoids a situation where an individual surpassing her parents by one year of education is treated as mobile in one country (with detailed categories) but not in another country (with coarse categories). Second, completing a full additional category signifies

argument of focusing on father-son pairings and strengthened the argument for including mothers and daughters in the measurement of intergenerational mobility.

a more meaningful increment in human capital; one additional year of schooling is unlikely to be rewarded in the labor market unless it yields the completion of a full category.

The fact that there is a maximum level of education, with very few individuals obtaining more than 21 years of schooling, introduces a ceiling effect. As countries develop and average years of schooling increase, it becomes increasingly more difficult for individuals to outperform their parents. When parents have tertiary education as well as their children, one may not want to classify these children as failing to be mobile as this may introduce a mechanical decline in absolute mobility at higher levels of development. For this reason, we will consider the subset of respondents whose parents are not in the top category.

For robustness, we also construct a measure of absolute mobility that uses education data in its most disaggregated form. The results obtained with this measure are presented in Section 6. In Appendix A, we consider two alternative measures of absolute mobility, one which considers everyone with tertiary education as mobile (denoted by *MIX*) and one which accounts for the magnitude of which children surpass or fall short of their parents' outcomes (denoted by *DIF*).

2.2. Relative mobility

Relative mobility is the extent to which an individual's position in the distribution of educational attainment is independent of the position of his/her parents. We consider the correlation coefficient between respondents' years of schooling and the years of schooling of their most educated parent, denoted by *COR*, as our primary measure of intergenerational persistence, and 1-*COR* as our primary measure of relative mobility. The regression coefficient from the intergenerational regression of respondents' years of schooling on parents' years of schooling (denoted by *BETA*) denotes an alternative measure of intergenerational persistence and will serve as our robustness check (see Section 6).

An advantage of the correlation coefficient is that it is invariant to changes in the marginal distributions of child and parents' education. The values of *COR*, however, do not have a natural economic meaning. By contrast, the regression coefficient tells us how much one year of additional schooling of parents is transmitted to their children on average. While *BETA* has a natural interpretation, it is sensitive to the marginal distributions. This means that changes in *BETA* may in part reflect changes in inequality levels rather changes in the intergenerational dependence structure.[6]

Further robustness checks are included in Appendix A where we consider: (a) the share of individuals who make it to the top quarter in terms of years of schooling of their generation out of those who were born to parents who ranked in the bottom half of their generation (denoted by

[6] The two measures are related as follows: $BETA = COR * \frac{SD(y_{child})}{SD(y_{parent})}$, where $SD(.)$ denotes the standard deviation.

BHQ4), and (b) the expected rank of an individual in the education distribution whose parents rank in the bottom half of the parent education distribution (denoted by *MU050*).

2.3. Mechanisms and related literature

Alesina et al. (2018) compare people's perceptions of mobility to recent data on actual intergenerational mobility. They find that "Americans are more optimistic than Europeans about intergenerational mobility, and they are over-optimistic relative to actual mobility in the United States, especially about the probability of a child from a family in the bottom quintile making it to the top quintile: the 'American dream.' … [P]aradoxically, optimism is particularly high in US states where actual mobility is particularly low." What makes a society intergenerationally mobile in actuality?

Public interventions that aim to equalize opportunities are a plausible channel through which mobility increases as countries become richer. Arenas and Hindriks (2020), for example, find that unequal school quality and unequal access to good schools reduce intergenerational mobility, and that mobility can be increased by means of school equalization interventions and desegregation policies (see also Hassler et al. 2007; Lee and Seshadri, 2019). In the absence of public interventions, models predict that mobility will decline as incomes increase (Becker and Tomes, 1979, 1986; Becker et al., 2018). Under the assumption that parents seek to optimize the incomes of their children (along with their own consumption), private investments in child human capital will generally increase both with parental income and parental human capital (Becker and Tomes, 1979, 1986; Loury, 1981; and Becker et al., 2018). It follows that children born to highly educated parents are twice fortunate; they benefit from the exposure to their parents' higher human capital but also from the higher (monetary) investments their parents make in their human capital (Guryan et al., 2008; Ramey and Ramey, 2010; Duncan and Murnane, 2011).

Children born to educated parents are more fortunate still when parent human capital and investments in their children act as complements, i.e. the efficiency of investments in child human capital increases with income. This seems a reasonable assumption (e.g. Lareau, 2011; Heckman and Mosso, 2014; Becker et al., 2018). High human capital parents may: (a) be better placed to navigate school systems (which can be key, particularly when there is a large heterogeneity in school quality) or more generally may be better at utilizing public education for their children, (b) reside in neighborhoods with better schools where their kids interact with similarly advantaged kids, (c) help them with homework, expose them to books, read their kids bedtime stories, and play educational games, (d) arrange additional tutoring etc. This would predict that the intergenerational persistence of human capital will grow stronger as incomes rise.

Credit market imperfections can further strengthen the intergenerational transmission of human capital, i.e. lower intergenerational mobility, most notably for families toward the bottom of the income distribution. If parents with low incomes have limited access to credit to invest in their children, then it can be expected that low levels of human capital will be transmitted from one

generation to the next. Restuccia and Urrutia (2004) find that approximately 50 percent of the intergenerational persistence in earnings can be accounted for by parental investments in their children's education.

Can public spending alter the relationship between socio-economic mobility and national income? Naturally, this will depend on the magnitude of public spending relative to private spending and on how governments will choose to allocate their public investments. Assume that the government sees its role as an equalizer of opportunities, by raising investments in the human capital of poor children toward levels that are more comparable to the investments received by children from richer families. Public investments could include policies to promote public school quality, education subsidies, and campaigns to improve aspirations of disadvantaged youth. This would reduce the importance of parental background in determining an individual's human capital (Kearney and Levine, 2016; Lee and Seshadri, 2019). Public interventions are found to be most effective when they focus on early childhood (Restuccia and Urrutia, 2004; Herrington, 2015; Blankenou and Youderian, 2015; Lee and Seshadri, 2019). The more resources the government dedicates to leveling the playing field, the larger the positive effect on intergenerational mobility will be. [7]

This brings us to our first hypothesis: To the extent that governments in more developed countries have more resources available than governments in less developed countries, intergenerational mobility can be expected to increase as countries get richer. This would be consistent with the empirical observation that national income growth is good for the poor (Dollar and Kraay, 2002; Dollar et al., 2016.). Growth can fund public spending on mobility enhancing interventions that will benefit the poor. Equity in turn is found to be good for growth (Marrero and Rodriguez, 2013), which suggests the possibility of a positive feedback loop.

The effect of public spending on intergenerational mobility may only "kick in" from middle income levels onwards, when government spending becomes sufficiently large. The positive relationship between relative mobility and national income may then only be observed for countries with national incomes above a certain threshold. For countries below this national income threshold, where public interventions that could equalize opportunities are comparatively small, relative mobility will be shaped by private resources. More specifically, by parent's optimizing behavior, in which case relative mobility may decline as income levels go up (see e.g. Becker et al., 2018). This suggests the possibility of a non-monotonic relationship between relative mobility and national income.

[7] What may matter more than overall spending is the extent to which investments produce key inputs into improving access to and quality of education. The existing literature observes that public interventions are more likely to increase mobility when: (a) public investments are sufficiently large (Iyigun, 1999), (b) are targeted to benefit disadvantaged families/neighborhoods (Mayer and Lopoo, 2008; Herrington, 2015; Blankenou and Youderian, 2015), (c) focus on early childhood (Herrington, 2015; Blankenou and Youderian, 2015), and (d) when political power is not captured by the rich unless the rich have the interests of the poor at heart (Uchida, 2017).

The relationship between absolute mobility and national income may similarly be non-monotonic as opposing forces are at play. On the one hand, we hypothesize that absolute mobility decreases with national income on the grounds that richer countries have more educated populations, making it harder for children to surpass the educational attainment of their parents. On the other hand, however, the capacity to educate children increases as countries become richer, which suggests a positive effect of national income on absolute mobility. The relationship between absolute mobility and national income will thus be determined by which of these two effects is stronger at different stages of national development.

3. Data

3.1. Identifying relevant surveys

To construct our Global Database on Intergenerational Mobility (GDIM), a comprehensive review of surveys that ask respondents about their parents' educational attainment was conducted. Eighty percent of the surveys selected were conducted after 2011 such that respondents born in the 1980s had a chance to complete their education by the time the survey data was collected. Only individuals aged 21 or more are included in the sample to minimize the fraction of individuals still enrolled in school while not removing too many individuals from the sample. If more than one relevant survey was found for a country, the survey was selected based on sample size and the quality of the parental education information.

Broadly speaking, three different types of surveys are used. For most developing countries, cross-sectional household income or expenditure surveys are used. For most countries in Europe and Latin America, social surveys such as the European Social Survey (ESS), the Latinobarometro, and the Life in Transition Survey (LITS) are used.[8] For a selected number of high-income countries, annual panels such as the Panel Study of Income Dynamics in the United States and the Labor & Income Panel Study in the Republic of Korea are used. A table with the list of surveys and years used can be found in Table B.1 in Appendix B.

The social surveys tend to have smaller sample sizes, so when multiple waves of the same survey contain relevant information on educational attainment, these waves are pooled. This includes three waves of the ESS (from 2010-2014), six waves of the Latinobarometro (from 2008-2015), and two waves of the LITS (2006 and 2011).

For several countries, including some of the developing world's largest countries such as Bangladesh and a notable number of countries in Sub-Saharan Africa, there are no surveys with retrospective data on parental education. In these cases, high-quality household surveys without

[8] Like Neidhöfer et al. (2018), Latinobarometro is used instead of Lapop, which is another social survey covering the Americas. Lapop only asks for mother's education. Conversely, Latinobarometro records the highest education level of father and mother, which is the variable used in this paper.

retrospective data are used instead. Information on parental education is obtained for respondents who reside in the same household as their parents – so-called co-residents.[9] Since co-residing adults need not be representative of the target population, estimates derived from this type of data may be subject to co-residence bias (Emran et al., 2017). The magnitude of this bias depends on the share of adults who co-reside with their parents and the extent to which co-residing adults differ from adults who live away from their parents.

To minimize co-residence bias, samples are restricted to co-residents aged 21-25 at the time of the survey. These respondents, who are part of the 1980s cohort, are often old enough to have had a chance to complete their education yet young enough such that a large majority still co-resides with their parents. Since co-resident surveys only allow us to estimate mobility for this cohort, we are unable to track mobility over time (i.e. across cohorts) for these countries. When time trends are analyzed, the same set of countries is used throughout, so these countries are dropped.

In Figure C.1 of Appendix C we use surveys with retrospective data on parental education to test the bias of estimating mobility with and without only relying on co-residents. We find that the size of the bias does not seem to be large enough to generate notable re-rankings.

3.2. Global coverage

In total, the GDIM provides estimates of intergenerational mobility – absolute and relative – for 153 countries representing about 97 percent of the world's population born in the 1980s (see Table 2). For 114 countries, or about 87 percent of the world's population, estimates of mobility span four decades: from those born in the 1950s to those born in the 1980s. In all regions but the Middle East and North Africa, the population coverage is greater than 90%. For the Middle East and North Africa, 83% of the population is covered (51% with retrospective questions).[10]

[9] For a handful of countries, recent surveys with co-resident data and older surveys with retrospective questions were combined; the co-resident data is used for the 1980s cohort and the older survey for the 1950s through 1970s cohorts. This applies to Pakistan, Mauritania, Philippines, Rwanda, and Guinea. For two countries, neither recent co-resident surveys nor retrospective surveys were identified, while older surveys with retrospective questions exist. This concerns New Zealand (2000 survey) and Bhutan (2003 survey). To maximize coverage, these surveys are utilized as well. Tabulations show that in Bhutan most respondents born in the 1980s had completed their education by the time of the survey. For New Zealand, it is assumed that the estimate for the 1980s cohort equals the estimate for the 1970s cohort.

[10] High-income countries are defined using the World Bank's income classification as of July 1, 2019. High-income countries are also referred to as "the developed world" in this paper. The remaining countries, referred to as the "developing world", are split further into geographic regions. More information on the income classifications and geographic regions is available here: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

Table 2: Coverage

Income group/region	Number of countries covered		Percent of population covered	
	With retrospective data	Total	With retrospective data	Total
High-income countries	38	38	93%	93%
Developing countries	76	115	86%	98%
East Asia and Pacific	8	18	92%	99%
Europe and Central Asia	20	20	99%	99%
Latin America and the Caribbean	15	16	95%	97%
Middle East and North Africa	6	10	51%	83%
South Asia	5	8	89%	100%
Sub-Saharan Africa	22	43	72%	97%
World	114	153	87%	97%

Note: The table shows the number of countries our database covers, and the population share that these countries account for.

3.3. Coding of education data

To improve comparability of estimates between surveys, a globally harmonized categorical measure of educational attainment is constructed. This measure represents the lowest common denominator across surveys, thus invariably reducing the amount of detail exploited in some countries. With minor exceptions, all surveys contain the following five categories, which are based on UNESCO's International Standard Classification of Education (ISCED): (i) less than primary (ISCED 0), (ii) primary (ISCED 1), (iii) lower secondary (ISCED 2), (iv) upper secondary or postsecondary nontertiary (ISCED 3–4), and (v) tertiary (ISCED 5–8).

The categories refer to the highest education level completed by the respondent. A few high-income countries do not have data on the first of these five categories. Since these countries have mandatory schooling at the primary level, it is assumed that all individuals have completed at least primary in these cases.[11]

Respondents who are younger than 21 years old or are still enrolled in school are excluded. The only exception to this rule is respondents who are enrolled in school, have completed upper secondary, and are 21 years or older. It is assumed that these individuals complete the lowest tertiary degree (ISCED 5).[12]

[11] This concerns some economies where LITS or ESS is used, as well as the United States; Taiwan, China; the Republic of Korea, Japan, Canada, and Australia. In these economies, no category below primary exists. For a few other countries, it was unclear how to code respondents who have completed Koranic or other religious schools. In general, we assume that these respondents completed education corresponding to the primary level.

[12] This assumption may matter for the estimates. If most individuals who are enrolled in tertiary and 20 years or older end up completing a master's degree (ISCED 7), they are assigned too little education. If these individuals, simultaneously, tend to have highly educated parents, mobility is underestimated. If these individuals instead were dropped from the analysis, representativeness would likely decrease.

Many of the surveys contain a direct question eliciting years of schooling completed. For the surveys where no such variable is available, UNESCO sources containing country- and year-specific mappings on the duration of educational programs are relied upon to construct a measure of years of education based on the answers to the categorical question.[13] The length of the various ISCED categories varies across countries, and changes over time within countries. Individuals are assigned to an educational regime based on their birth year and the school entry age. When reforms occur at an education level, it is assumed they apply to individuals who have not yet entered that education level. For example, it is assumed that an extension of lower secondary from 3 to 4 years does not affect children who are already enrolled in lower secondary.[14]

Years of schooling do not account for differences in the quality of education. A year of schooling in, say, Singapore may be of very different quality than a year of schooling in Malawi. Due to a lack of global data on educational quality, especially for the cohorts considered in this paper, years of schooling is relied upon here. To the extent that quality of schooling is relatively stable over time (i.e. varies primarily between countries and comparatively less within country and over time), comparisons of individual educational attainment relative to that of their parents would be approximately independent of school quality. In that case, the implication of not observing educational quality for the estimation of intergenerational mobility is conceivably modest.

4. Intergenerational mobility around the world

4.1. Absolute mobility is highest in the developed world

Absolute mobility in education is found to vary considerably across the 153 economies (for those born in the 1980s), with a clear geographic pattern (Figure 1). Sub-Saharan Africa stands out as the region with some of the lowest rates of absolute mobility. In some of the poorest or most fragile countries in the region, the share of respondents that have more education than their parents is less than 20 percent, compared to over 80 percent in parts of East Asia. Of the 15

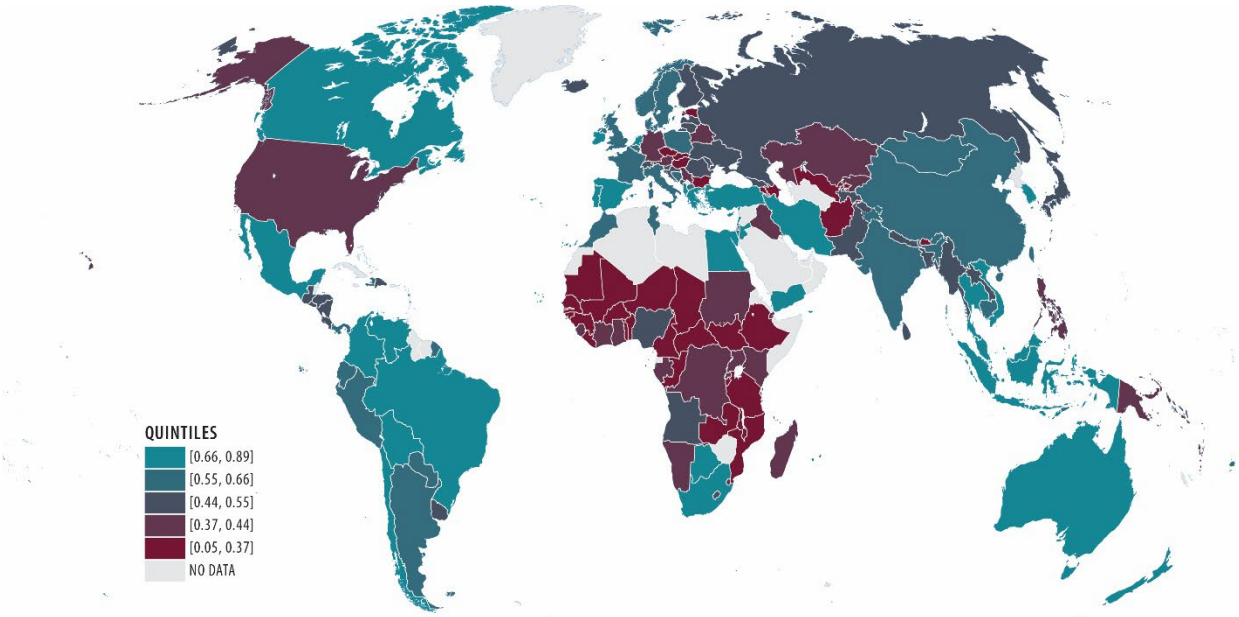
[13] Two sources of information are used. The first source (http://uis.unesco.org/en/isced-mappings) is not available for all countries and for the most part only conveys the duration of ISCED categories in 1997 and 2011. This source is supplemented with information from UNESCO's online database (http://data.uis.unesco.org/), which outlines the length of durations of ISCED categories by year from 1970.

[14] The UNESCO information is not available before 1970, so for individuals who went to school before 1970 the durations from 1970 are applied. When information is missing in the UNESCO sources, additional country-specific information is used or the following rule for converting ISCED categories to completed years of schooling is applied: (i) ISCED 1: 6 years, (ii) ISCED 2: 9 years, (iii) ISCED 3: 12 years, (iv) ISCED 4: 13 years, (v) ISCED 5: 15 years, (vi) ISCED 6: 16 years, (vii) ISCED 7: 18 years, and (viii) ISCED 8: 21 years. In a handful of countries, a years of schooling variable is present but a categorical variable is not. In these cases, the reverse conversion using the country- and year-specific mappings is used.

countries in the bottom decile of absolute mobility, 10 are in Sub-Saharan Africa, with six of these in fragile situations. In the average country of Sub-Saharan Africa, 36 percent of those born in the 1980s have a higher level of education than their parents, as compared to 57 percent of the same generation in the average country of East Asia & Pacific. Absolute mobility for the 1980s cohort is also relatively high in Western Europe, Canada, South America, parts of the Middle East, and South Africa. The United States and Germany stand out among the high-income countries by having low levels of absolute mobility. On average, absolute mobility is significantly lower in developing (low- and middle-income) countries than in high-income countries.

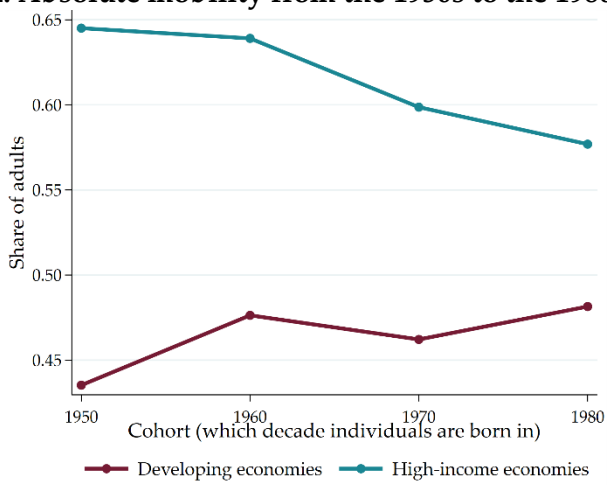
To see whether the gap between high-income and developing countries extends to older generations, average absolute mobility for each group is tracked over time. The averages are unweighted by population, which means that they represent the average mobility of countries and not of the average individual in each group. Figure 2 shows that average absolute mobility is lower in developing countries throughout the 40-year period. The gap is larger for those born in the 1950s, and has narrowed over time, largely because of a decline in average absolute mobility in high-income countries since the 1960s generation.

Figure 1: Absolute mobility around the world (1980s cohort)



Note: The map captures absolute mobility for individuals born in the 1980s. Absolute mobility is based on five categories of educational attainment (*CAT*). Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. The color-coding on this map for Taiwan, China represents the data value for China which is 0.56. The data value for Taiwan, China is 0.91.

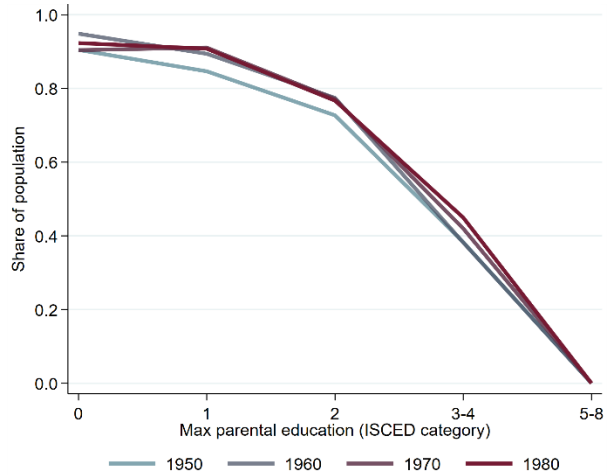
Figure 2: Absolute mobility from the 1950s to the 1980s cohort



Note: The figure shows unweighted averages of intergenerational mobility estimates. Absolute mobility is based on five categories of educational attainment (*CAT*).

That average absolute mobility has been falling in high-income countries is not surprising – it becomes increasingly difficult to surpass one's parents as educational attainment increases from one generation to the next. What is more surprising is that absolute mobility continues to be much lower in the developing world and has stagnated in the average low-income country for the last 30 years, given that the scope for surpassing the education level of one's parents is much higher in these countries. For example, the tertiary attainment rate among the parents of the 1980s generation in developing countries is comparable to that of the parents of the 1950s generation in high-income countries.

Figure 3: Absolute mobility by level of parental education (high-income)



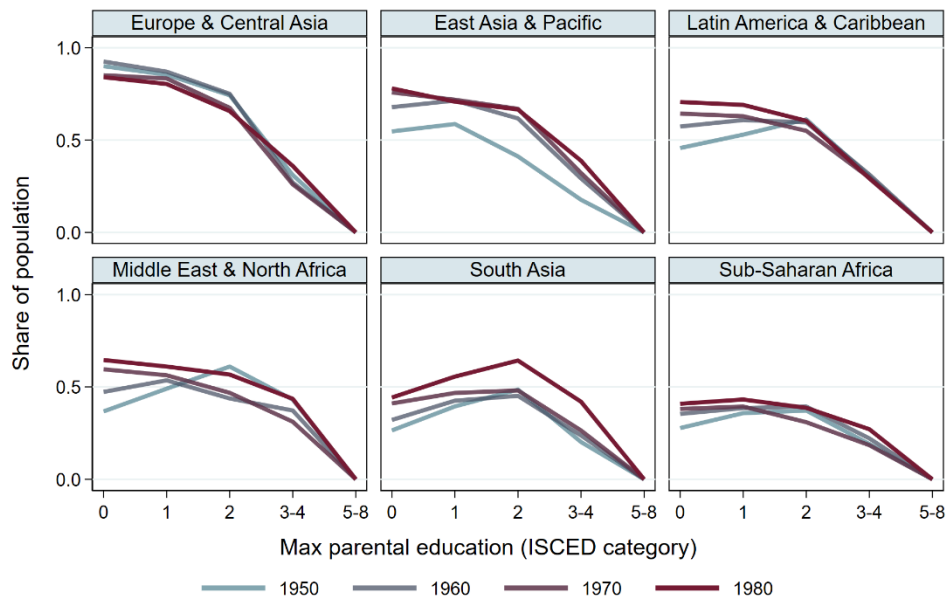
Note: ISCED category refers to UNESCO's International Standard Classification of Education. ISCED 0 = less than primary, ISCED 1 = primary, ISCED 2 = lower secondary, ISCED 3-4 = upper secondary or postsecondary nontertiary, ISCED 5-8 = tertiary.

In Figure 3, we plot the percentage of children who have more education than their parents against the education of their parents for the average high-income country. As one would expect,

absolute mobility (conditional on parental education) declines with parental education, and mechanically reaches zero at the highest level of parental education. If the same curve were also to apply to the average developing country, then absolute mobility would in fact be higher in the developing world, where parents have lower levels of education.

Figure 4 confirms that the relationship between absolute mobility and parental education takes a different shape for developing countries. The different panels of Figure 4 correspond to the average country in each of the six developing regions. The curve takes an inverted-U shape for the younger (1970s and 1980s) generations in South Asia and Sub-Saharan Africa, and for older (1950s and 1960s) generations in all developing regions other than Europe and Central Asia. This suggests that individuals with less-educated parents, who are likely to be poorer, are also less likely to be upwardly mobile in most developing countries. That the inverted-U is most pronounced and persistent over time in the two poorest regions, Sub-Saharan Africa and South Asia, is particularly suggestive: the poorer the region, the more likely it is that individuals born to parents who do not have an education lack the means to get an education, which creates something akin to a poverty trap.

Figure 4: Absolute mobility by level of parental education (by region)



Note: ISCED category refers to UNESCO's International Standard Classification of Education. ISCED 0 = less than primary, ISCED 1 = primary, ISCED 2 = lower secondary, ISCED 3-4 = upper secondary or postsecondary nontertiary, ISCED 5-8 = tertiary.

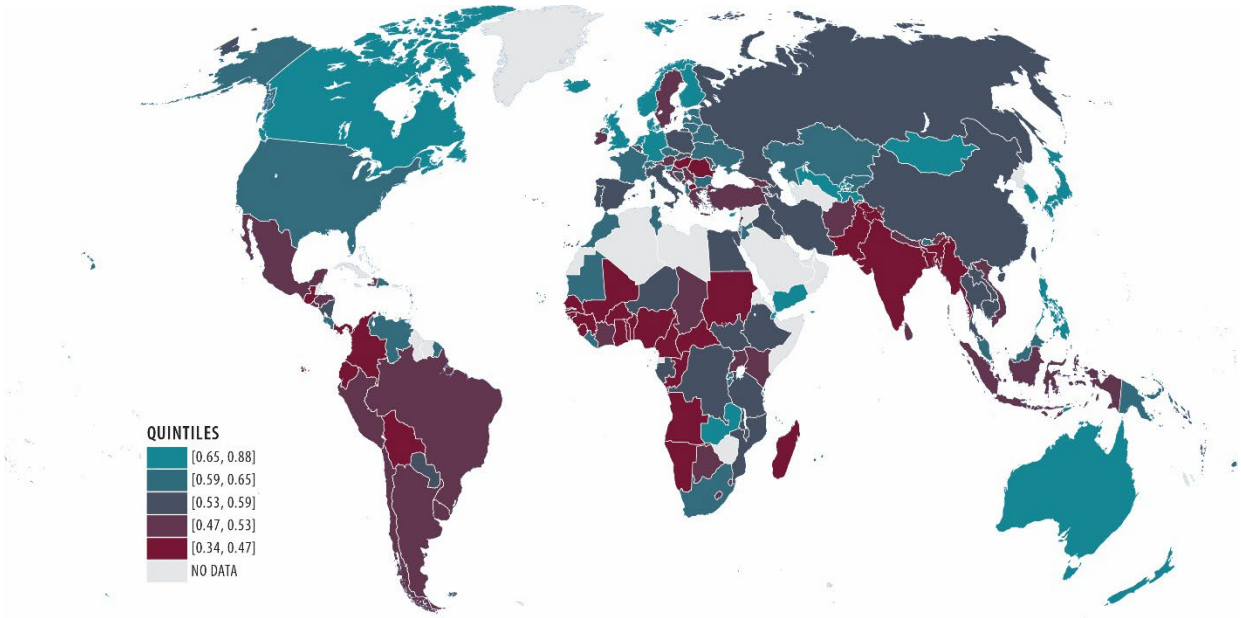
A plausible explanation for this apparent paradox is the lower availability of resources, parental and public, to invest in children in developing countries. In the developing world, children born in poorer (and less educated) households are so constrained in accessing opportunities, that they cannot take advantage of the greater scope for surpassing their parents when they have very little to no education. This generates a

different relationship between absolute mobility and parental education in the developing world where the lower capacity to educate children outweighs the greater scope for surpassing parents with little to no education. Fortunately, the poverty trap associated with this inverted-U pattern appears to be weakening with each new generation in all regions, as the inverted-U gradually morphs into the pattern observed for the average high-income country as regions become richer.

4.2. Relative mobility is falling in the developing world

Our estimates suggest that for large parts of the world's population born in the 1980s, an individual's education is closely tied to the education of one's parents. Figure 5 plots our estimates of relative mobility for all 153 economies for the 1980s cohort. South America, South Asia, and parts of Sub-Saharan Africa stand out as regions with some of the lowest levels of mobility. We find that 20 of the 25 least mobile countries are either in Sub-Saharan Africa, Latin America, or South Asia. Conversely, some of the highest levels of mobility are also found in Sub-Saharan Africa and South Asia (Maldives and Bhutan).

Figure 5: Relative mobility in education around the world (1980s cohort)



Note: The map captures relative mobility for individuals born in the 1980s. Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. Relative mobility is measured as one minus the correlation coefficient between children's and parents years of schooling.

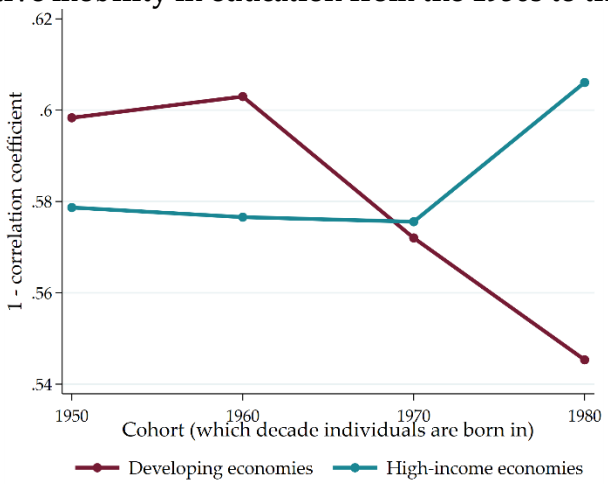
Figure 6 plots the trend in (unweighted) average relative mobility in education across cohorts born between the 1950s and 1980s. It can be seen that for the current generation (the 1980s cohort), average relative mobility is lower in the developing world when compared to the developed world. Relative mobility used to be higher in the average developing country (for the cohorts of

1950s and 1960s), possibly for the wrong reasons which we will explain later, but it has been falling ever since the 1960s cohort, while relative mobility is showing an upward trend in the high-income world.

4.3. Girls in the developing world are furthest behind

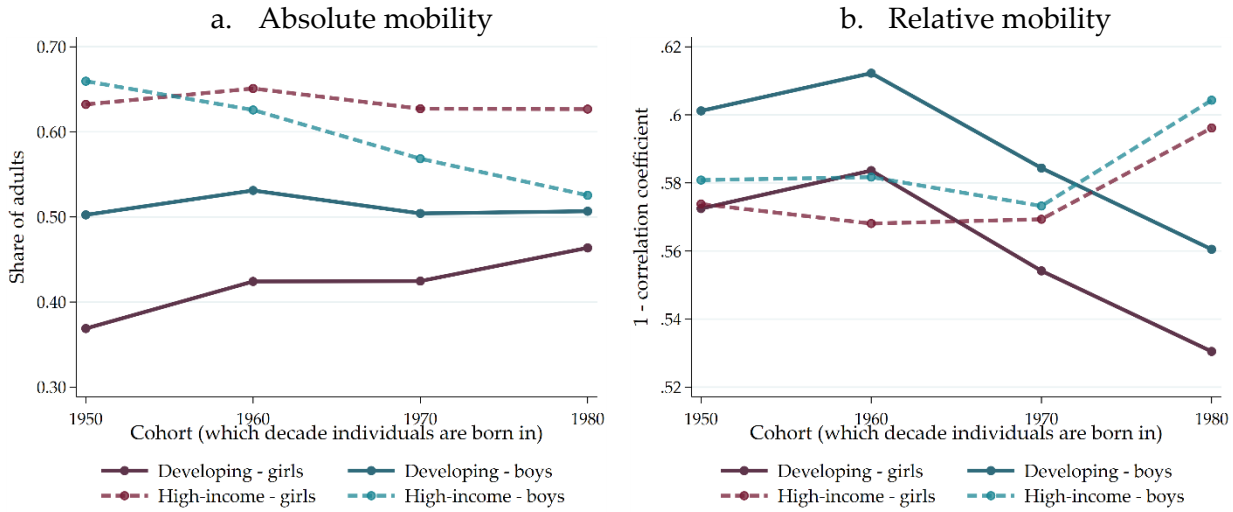
Disaggregated time-trends in intergenerational mobility by gender are presented in Figure 7. With respect to absolute mobility, for individuals born in the 1950s in the high-income world, boys had a greater chance of surpassing their parents than girls (Figure 7a). Since then, girls have overtaken boys, such that girls now have a larger probability of surpassing both parents. In the developing world the picture looks different. Although the gender gap has narrowed over time for the average developing country, boys continue to have a larger chance of surpassing their parents than girls. This means that whereas boys in the high-income world and developing world have similar chances of surpassing their parents, girls in the high-income world and developing world face starkly different odds of surpassing their parents. If current time-trends prevail however, girls are on track for surpassing boys in terms of absolute mobility in the developing world in the coming decade(s).

Figure 6: Relative mobility in education from the 1950s to the 1980s cohort



Note: The figure shows non-population weighted average intergenerational mobility estimates. Relative mobility is measured as one minus the correlation coefficient between children's and parents' years of schooling.

Figure 7: Intergenerational mobility from the 1950s to the 1980s cohort by gender



Note: The figure shows unweighted averages of intergenerational mobility estimates.

With respect to relative mobility, there are no notable differences between boys and girls for the average high-income country (Figure 7b). For the average developing country however, the high initial level of relative mobility appears to be driven by boys, while boys have maintained a higher relative mobility throughout the period. There is no indication that the gender gap in relative mobility observed in the developing world is declining.

5. Correlates of intergenerational mobility

Why are some countries more intergenerationally mobile than others? Although causally identifying the determinants of intergenerational mobility is beyond the scope of this study, we will correlate our estimates of intergenerational mobility with a set of salient country characteristics to shed some light on this question. To the extent possible we evaluate the correlates for the time periods during which the children were of school age, which for the most recent cohort means we will be using data for the early 1990s.

5.1. Intergenerational mobility and national income exhibit a non-linear relationship

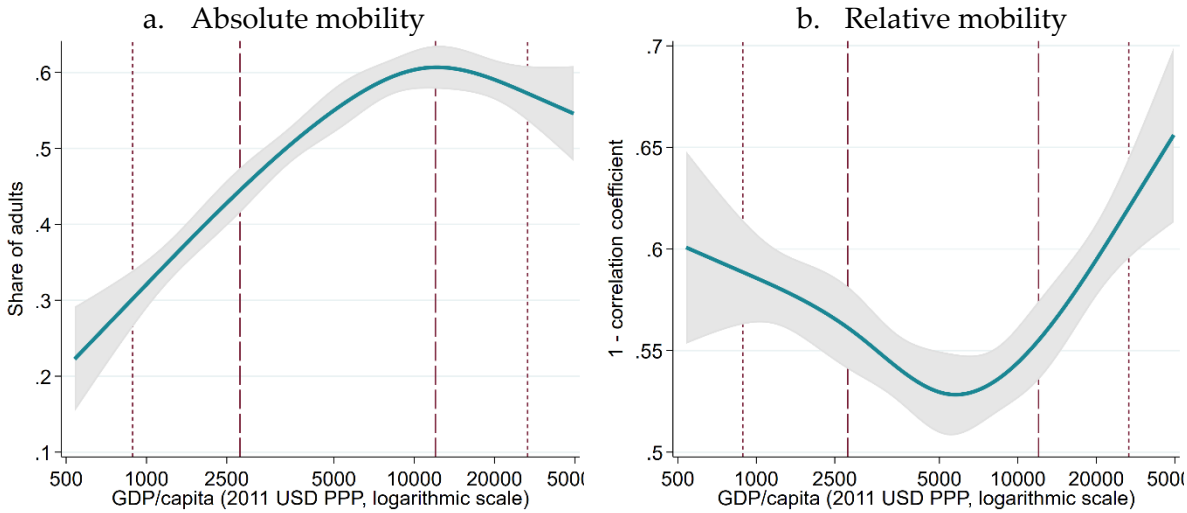
The relationship between intergenerational mobility and national income does not appear to be monotonic. It is better described by a U-curve for relative mobility and an inverse U-curve for absolute mobility. Figure 8 plots the relationship between intergenerational mobility and real GDP per capita across countries and across cohorts for our measures of absolute and relative intergenerational mobility.

Absolute mobility is seen to fit an inverted-U relationship with GDP per capita; the lowest rates of absolute mobility are observed for the poorest countries (where the threshold for surpassing parents' education is low but so is the capacity to educate children) and in the richest countries

(where the capacity to educate children is high but so is the threshold for surpassing parents' education levels). The first part of the inverted-U reflects a poverty trap, while the second part reflects a ceiling effect as it becomes harder to increase educational attainment once an intermediary or higher level of education is reached.

Relative mobility is on average highest in the poorest and the richest countries, but arguably for different reasons. A candidate explanation for this pattern for relative mobility is the following. In the world's poorest countries, a large majority of parents have no education. When there is little variation in parental education, it will be a poor predictor of individual socioeconomic status (i.e. it matters less what household one is born into when the large majority of parents are equally deprived), indicating a high level of relative mobility. As countries develop and increase their levels of human capital, parental education levels will start to diverge. When these gaps become sufficiently large and are not adequately compensated for through public interventions, it will matter for an individual's educational success whether he/she is born into a poor or better-off family background (which in turn is correlated with parental education). Hence, in countries where the variation in social class is significant while the infrastructure needed to equalize opportunities may not yet be affordable, relative mobility is expected to be low. When countries increase their national incomes further, they will develop the fiscal space necessary to fund the type of public interventions that will give children born into disadvantaged backgrounds the opportunities to fulfill their potential (i.e. public interventions will partly compensate for inequalities in private investments). As the public interventions grow in size and effectiveness, relative mobility is expected to increase.

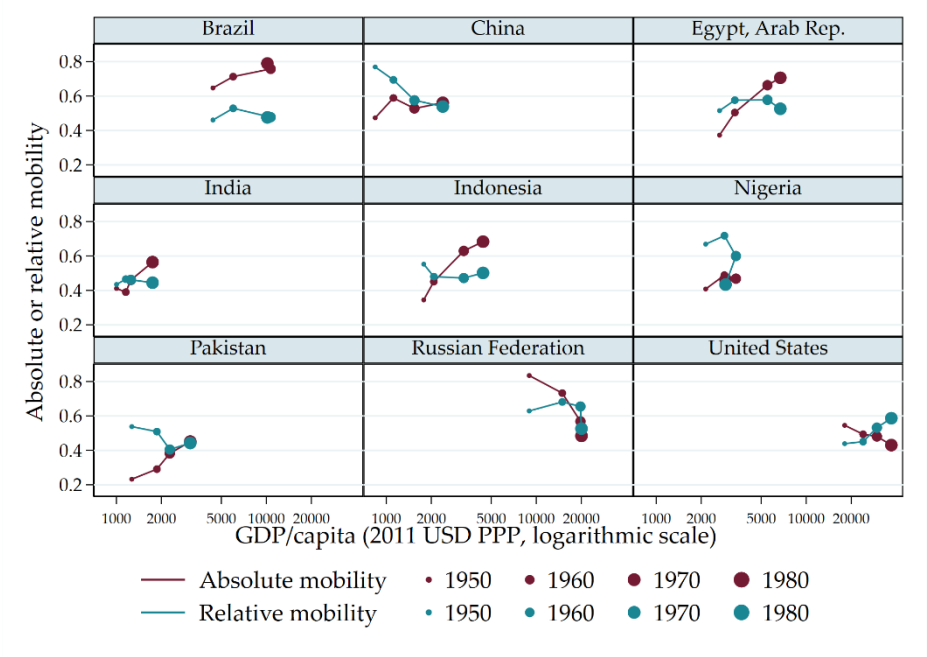
Figure 8: Intergenerational mobility vs. GDP/capita



Note: The dashed lines indicate the 25th and 75th percentile of the distribution of GDP per capita. The dotted lines indicate the 5th and 95th percentile. GDP data is from the World Development Indicators, supplemented with data from the Maddison project where necessary. We match a cohort with the GDP per capita when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s, we match with the GDP per capita from 1990, at which point the cohort on average was five years old.

Figure 9 examines whether the same patterns are observed for individual countries by plotting changes in mobility and national income over time for 9 large countries. No country moves from high levels of poverty to high-income over this time period, such that we would not expect to see the full U-curve, but rather parts of the U-curve. For Brazil, the Arab Republic of Egypt, India, Indonesia, and Pakistan, the picture for absolute mobility broadly follows the global trend. Starting from low levels of GDP per capita, as the countries grew wealthier, they increased absolute mobility. Likewise, the United States and the Russian Federation, which both started at levels where the global pattern predicts declines in absolute mobility, indeed experienced declines in absolute mobility.[15] With regards to relative mobility, the observed patterns are less conclusive.

Figure 9: Intergenerational mobility vs. GDP/capita for 9 large countries



Note: GDP data is from the World Development Indicators, supplemented with data from the Maddison project where necessary. We match a cohort with the GDP per capita when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s, we match with the GDP per capita from 1990, at which point the cohort on average was five years old.

5.2. Mobility is positively correlated with public expenditures

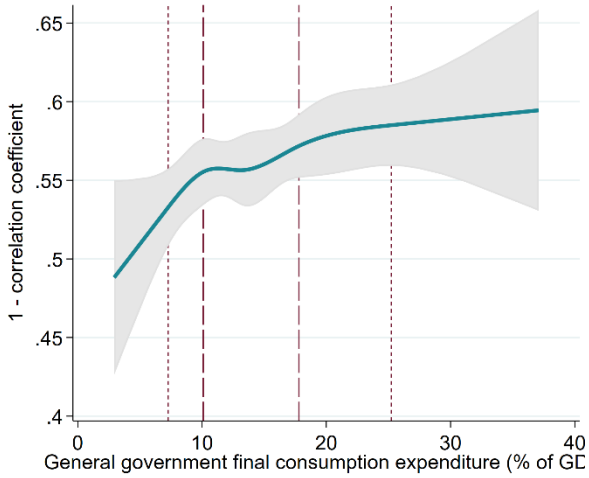
Public interventions that aim to equalize opportunities are one plausible channel through which mobility increases as countries become richer, as discussed above. Figure 10 shows how the level of relative mobility varies with public spending controlling for the level of national income. The estimated correlations provide support for the importance of public investments. Higher public

[15] The decline in the US is consistent with the evidence presented in Chetty et al. (2017).

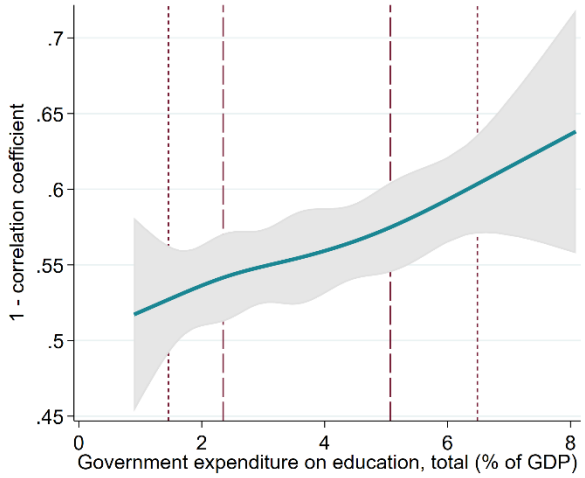
spending is strongly associated with higher relative mobility in education. The relationship is even stronger when public spending only on education is considered (panel b).

Figure 10: Relative Mobility vs. Public Spending in General and on Education

a. Relative mobility vs public spending



b. Relative mobility vs public spending on education



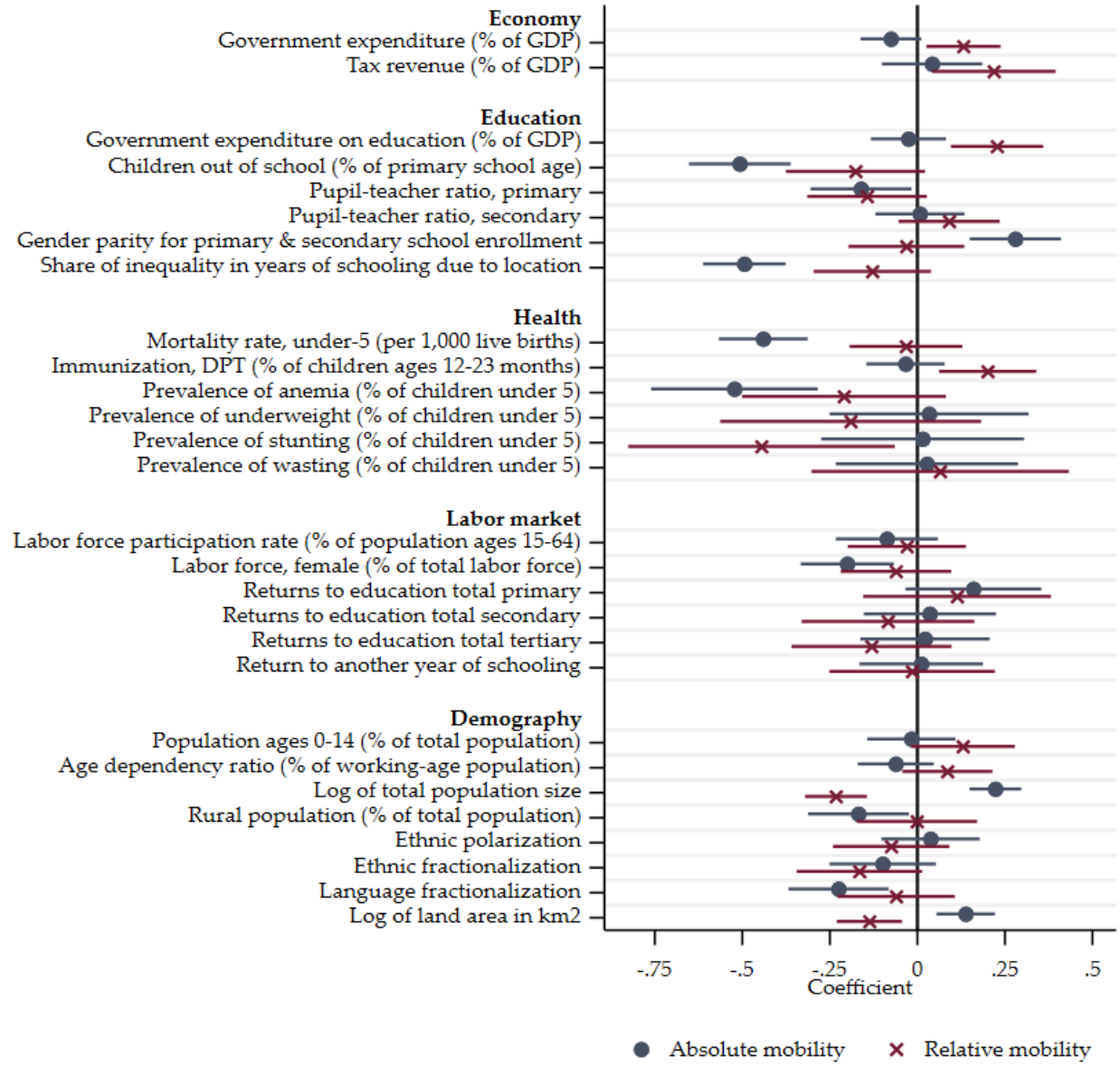
Note: The dashed lines indicate the 25th and 75th percentile of the distribution of the x-variable. The dotted lines indicate the 5th and 95th percentile. Data on general government final consumption expenditure and government expenditure on education is from the World Development Indicators. We match a cohort with the data on government spending when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s, we match with the GDP per capita from 1990, at which point the cohort on average was five years old. The plots control for a second-order polynomial of GDP per capita.

5.3. Other correlates of intergenerational mobility

In this section we examine factors beyond national income and public expenditure levels that are conceivably correlated with intergenerational mobility. Figure 11 plot the regression coefficients from regressions with intergenerational mobility (standardized to have mean 0 and variance 1) as the dependent variable and the given correlate (also standardized to have mean 0 and variance 1) as the independent variable controlling for a second-order polynomial of log GDP/capita. The dots show the point estimate while the lines show the 95 percent confidence intervals.

The correlates are organized into the following groups: (a) economic (fiscal space), (b) education, (c) health, (d) labor market, and (e) demographics. The coefficients observed for government expenditures and tax revenue (which provide the necessary fiscal space for public interventions) are consistent with the patterns we observed earlier: public expenditures in general and on education in particular are positively correlated with relative mobility, after controlling for national income.

Figure 11: Correlates of intergenerational mobility



Note: The figure plots the coefficients from regressing a measure of intergenerational mobility (standardized to have mean 0 and variance 1) on the covariate in question (standardized to have mean 0 and variance 1) while controlling for a second-order polynomial of log GDP/capita. The lines show 95 percent confidence intervals. The covariate data come from the World Development Indicators with the exception of (a) "share of inequality in years of schooling due to location", which we calculate from our own database as the share of between-province inequality to overall inequality; (b) the polarization and fractionalization variables which we obtain from Montalvo & Reynal-Querol (2005) and Alesina et al. (2016); and (c) the returns to education variables which we obtain from Montenegro and Patrinos (2014). For all data from the World Development Indicators, we match a cohort with the covariate data when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s we match with covariate data from 1990, at which point the cohort on average was five years old. For the data on returns to education, we match a cohort with the returns to education data when the cohort, on average, was about to enter the labor markets. For example, the cohort born in the 1980s, we match with returns to education data from 2000.

Beyond a country's fiscal space and public expenditure levels, we identify four different types of factors that are significantly correlated with intergenerational mobility. First, child health indicators are seen to be positively correlated with intergenerational mobility. We observe a negative coefficient for stunting, a positive coefficient for immunization rates, and negative coefficients for the prevalence of anemia and mortality rates. When children from disadvantaged backgrounds do not have access to adequate nutrition and health care, this may have long-term negative effects on their cognitive development. The resulting gaps in cognitive development means that disadvantaged and advantaged children could be learning at different rates, even when they would have access to schools of comparable quality.

Second, proxies for school quality are found to be positive factors: Intergenerational mobility tends to be higher in countries where there are more teachers per student (i.e. lower pupil-teacher ratios) and where the share of children dropping out of school early is low.

Third, proxies for segregation are negatively correlated with mobility: countries where the share of total inequality in years of schooling that is due to between-district variation in schooling (versus within-district variation) tend to report higher levels of intergenerational mobility in education. Ethno-linguistic fractionalization is similarly negatively correlated with mobility, albeit weakly.

Fourth, factors that may be indicative of the reach of public interventions are positively correlated with relative mobility: countries with higher mobility levels are more likely to be countries that are relatively small in terms of population and/or land area and tend to be more urbanized (possibly because it is easier to organize high-quality public interventions with a broad reach when countries are small with the population living in closer proximity to each other and to public services).

Labor market variables are found to exhibit little to no correlation with intergenerational mobility in education. These variables will conceivably report stronger correlations with measures of income mobility which, unlike education mobility, will be more sensitive to the functioning of the labor market.

6. Robustness

In this section we re-evaluate the trends and patterns in intergenerational mobility using alternative measures for both absolute and relative mobility.

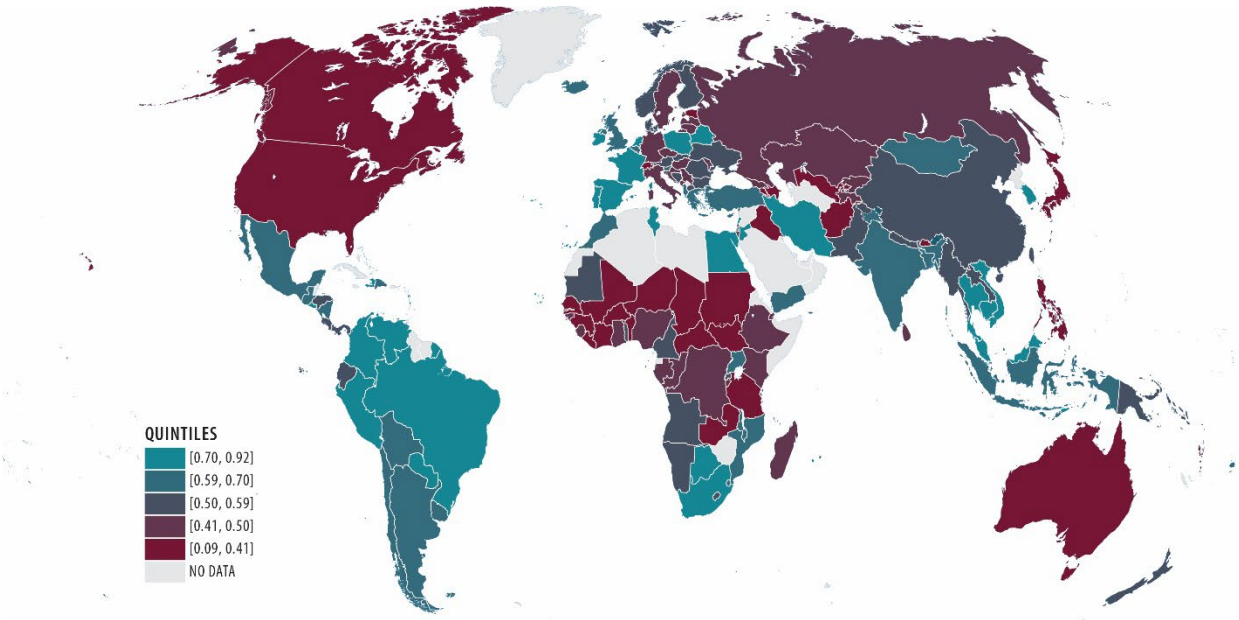
6.1. Intergenerational mobility across space and time

Absolute mobility

As a robustness check we also evaluate absolute mobility (denoted by *YOS*) using education data in its most disaggregated form, which is years of schooling completed. *YOS* measures the share

of respondents with greater years of schooling completed than their parents, conditional on parents not having obtained the highest year of schooling observed in the sample. This has the advantage that it is less coarse, and hence drops fewer individuals from the sample compared to *CAT*. This measure might therefore provide a better picture of absolute mobility in high-income countries. On the flipside, cross-country comparisons with countries that do not disaggregate education by years of schooling (some only record the five categories used in *CAT*) may be compromised.

Figure 12: Absolute mobility around the world (1980s cohort)

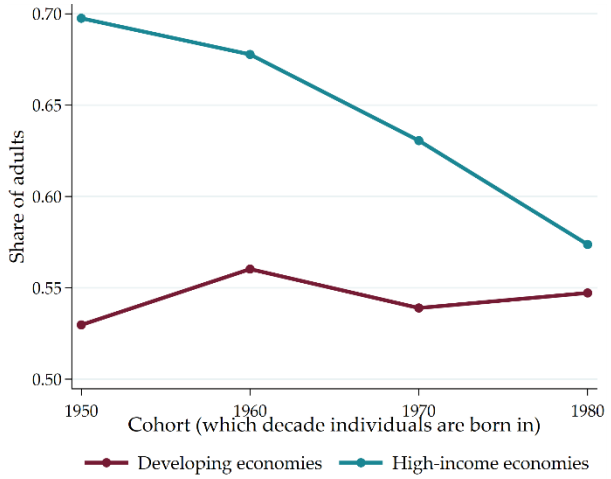


Note: The map captures absolute mobility for individuals born in the 1980s. Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. Absolute mobility is based on a measure of years of schooling (YOS). The color-coding on this map for Taiwan, China represents the data value for China which is 0.55. The data value for Taiwan, China is 0.84.

Figure 12 confirms that the global map of absolute mobility is largely robust to the choice of measure: Sub-Saharan Africa stands out with low levels of absolute mobility, while East Asia and South America report comparatively high levels of absolute mobility. Results for two additional measures of absolute mobility are presented in the Appendix (Figure A.1), which provide further confirmation of the empirical observations that high-income economies outperform their developing peers in terms of absolute mobility.

The gap between high-income and developing countries is seen to extend to older generations. Figure 13 shows that this stylized fact is robust to the choice of absolute mobility used.

Figure 13: Absolute mobility from the 1950s to the 1980s cohort

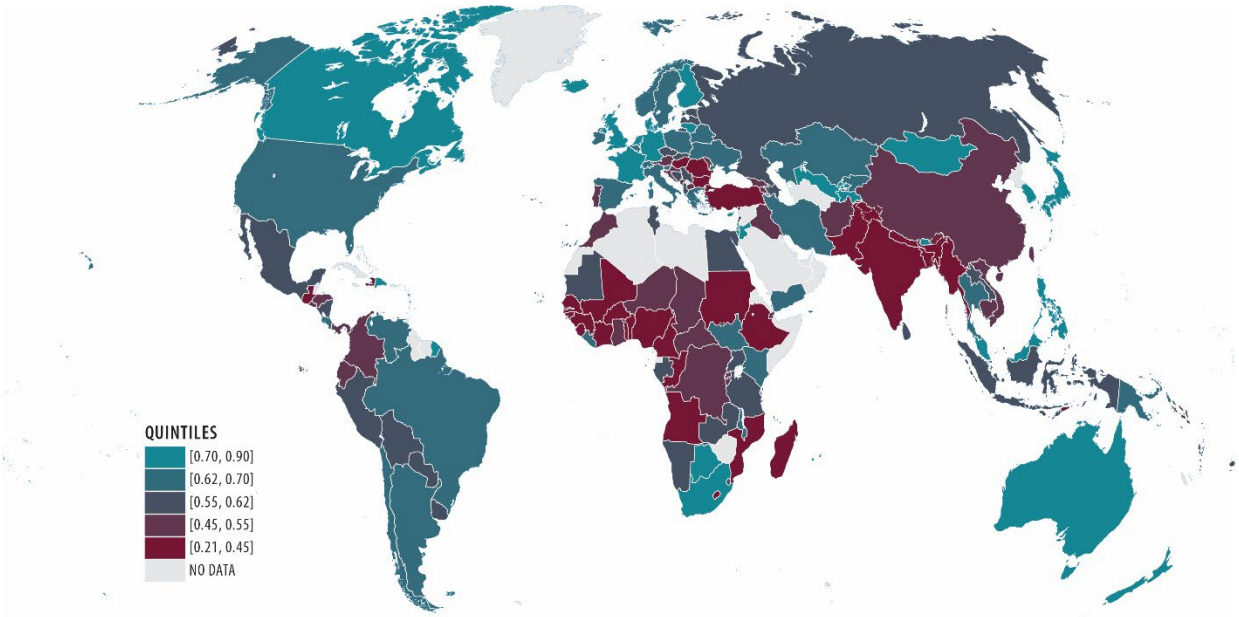


Note: The figure shows unweighted averages of intergenerational mobility estimates. Absolute mobility is based on a measure of years of schooling (YOS).

Relative mobility

Figure 14 shows the global map of relative mobility for the 1980s cohort when intergenerational persistence is measured by the regression coefficient instead of the correlation coefficient. Both measures of relative mobility provide qualitatively similar geographic distributions with the exception of how they rank South America. Our primary measure of relative mobility (*1-COR*), which is invariant to changes in the marginal distributions of education, identifies Latin America as a region with comparatively low levels of relative mobility. Latin America reports higher levels of relative mobility when *1-BETA* is used. This indicates that in countries in Latin America, the standard deviation of children's years of schooling is relatively small compared to the standard deviation of their parents' years of schooling, which would be consistent with the declining trend in income inequality that is observed for Latin America (e.g. Lopez-Calva and Lustig, 2010). Results for two additional measures of absolute mobility are presented in the Appendix (Figure A.2),

Figure 14: Relative mobility in education around the world (1980s cohort)



Note: The map captures relative mobility for individuals born in the 1980s. Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. Relative mobility is measured as one minus the coefficient from regression children's years of schooling on their parent's years of schooling *(1-BETA)*. The color-coding on this map for Taiwan, China represents the data value for China which is 0.52. The data value for Taiwan, China is 0.66.

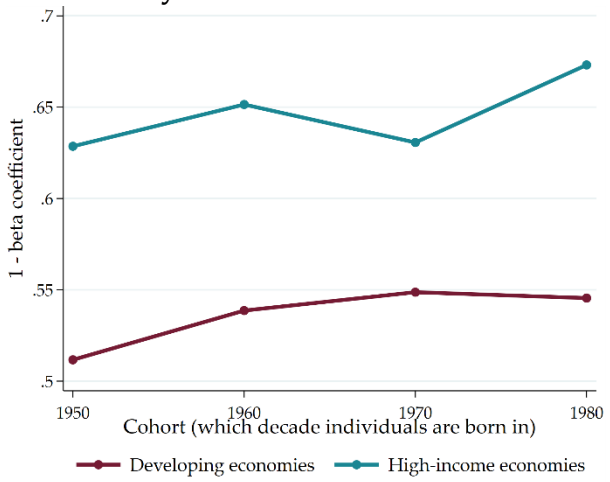
Figure 15 plots the time-trend in average relative mobility in education measured by *1-BETA*. Comparing this to the time-trend for 1-*COR* shown in Figure 6, the two measures lead to slightly different results. It can be seen that at any point in time, average relative mobility measured by *1-BETA* is lower in developing countries, while mobility has been increasing steadily in both country groups since the 1950s cohort. When using *1-COR*, relative mobility was higher in the average developing country for the cohorts of 1950s and 1960s. This measure of relative mobility has been falling over time in the developing world, while it has been increasing over time in the high-income world. For the 1980s cohort, relative mobility is higher for the average high-income country regardless of the choice of measure. A qualitatively similar picture to the one with *1-COR* is found with our additional measures of relative mobility presented in the Appendix (Figure A.3). As explained in Section 6.2, the diverging patterns seen for *1-BETA* may in part be mechanical.

6.2. Intergenerational mobility versus national income

Figure 16 plots our alternative measures of absolute and relative mobility against GDP per capita. The relationship between absolute mobility and national income levels is robust to the choice of mobility measure used. Absolute mobility is lowest in the world's poorest countries (where the scope for surpassing parents is greatest but the capacity to educate children is lowest) and the

world's richest countries (where the capacity to educate children is greatest but the scope to surpass parents is lowest). This pattern is also reasonably robust to two other absolute mobility measures (see Figure A.4 in the Appendix).

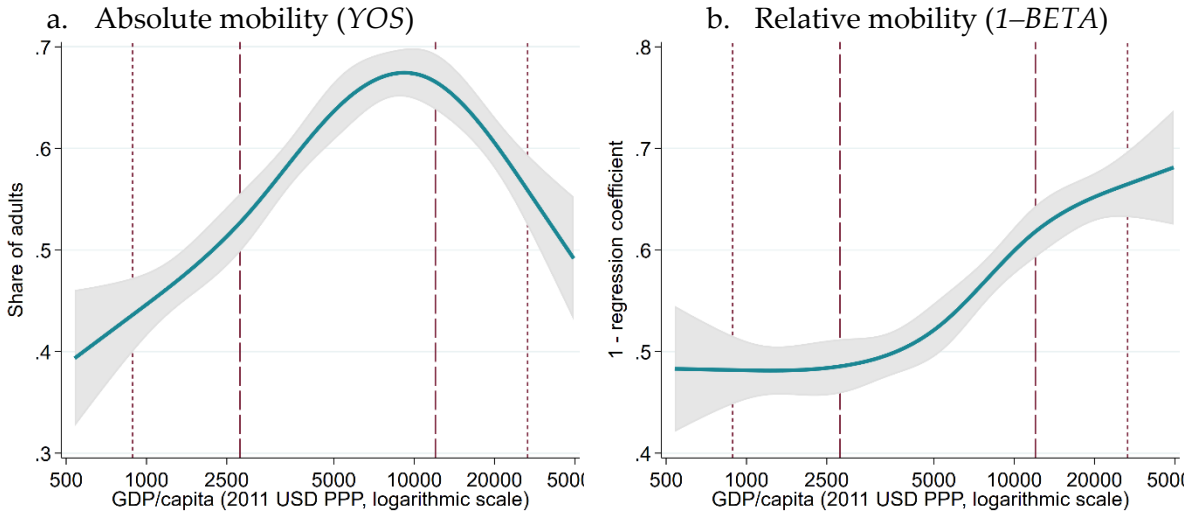
Figure 15: Relative mobility in education from the 1950s to the 1980s cohort



Note: The figure shows non-population weighted average intergenerational mobility estimates. Relative mobility is measured as one minus the beta coefficient regressing years of schooling of children on years of schooling of parents.

The relationship between relative mobility and national income is more sensitive to the choice of measure used. The U-pattern that is observed between 1-COR and national income is modified to a monotonically increasing relationship with GDP per capita when *1-BETA* is used. This change is partly mechanical. Unlike the correlation coefficient, the regression coefficient is also sensitive to changes in inequality in education levels from one generation to the next, as explained in Section 2. Specifically, *BETA* = *COR**st.dev(educchild) / st.dev(educparent). The standard deviation of years of schooling tends to zero when average years of schooling approaches either zero or the maximum level of education. This predicts that the standard deviation follows an inverse U-shape as a function of mean years of schooling. An implication of this is that the ratio of standard deviations, which enters directly into the equation for *BETA*, starts off high (when it is near zero for parents and higher for their children) and declines as average years of schooling increases. Consequently, for a given correlation between parent and child years of schooling, the regression coefficient *BETA* peaks (that is, *1-BETA* is at a trough) among the poorest countries and declines as these countries accumulate human capital and national income.

Figure 16: Intergenerational mobility vs. GDP/capita



Note: The dashed lines indicate the 25th and 75th percentile of the distribution of GDP per capita. The dotted lines indicate the 5th and 95th percentile. GDP data is from the World Development Indicators, supplemented with data from the Maddison project where necessary. We match a cohort with the GDP per capita when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s, we match with the GDP per capita from 1990, at which point the cohort on average was five years old. Absolute mobility is based on *YOS* and relative mobility is based on *1-BETA*.

7. Conclusion

A society with high (relative) intergenerational mobility is one where an individual's socioeconomic success is less dependent on the socioeconomic success of his or her parents. Governments have a multitude of reasons for stimulating intergenerational mobility. When mobility is low, one's chances of education and income success are largely predetermined by the accident of birth, which goes against a basic notion of fairness in most societies. Low mobility may also lead to unrealized human potential and a misallocation of resources, as talented individuals from disadvantaged families are excluded from opportunities, which favor those born in greater privilege rather than those with the greatest potential. Reducing such inefficiency is arguably good for economic growth. And since the waste of human potential is more likely at the bottom of the income distribution, policies promoting higher relative mobility are likely to promote growth that is more inclusive in nature. To our knowledge, this study is the first attempt to paint a truly global picture of intergenerational mobility. Our newly compiled database provides estimates of intergenerational mobility in education for 153 countries representing about 97 percent of the world's population born in the 1980s. For 114 countries, or 87 percent of the world's population, estimates of mobility span four decades: from those born in the 1950s to those born in the 1980s.

Our estimates suggest that for the majority of the world's population, individual education success is highly contingent on the educational success of one's parents. This intergenerational persistence in human capital, or lack of intergenerational mobility is particularly pronounced in the developing world. Our estimates indicate however that the relationship between intergenerational mobility and national income is not a monotonic one. Relative mobility is on average highest in the poorest and the richest countries, which may be explained as follows. In the world's poorest countries, a large majority of parents have no education. When parents are equally deprived, it matters less what household one is born into, implying a high level of relative mobility. As countries increase their education and income levels, the gaps between poor, middle-class and better-off parents become more pronounced. Without public interventions, children's education trajectories will eventually start to diverge depending on whether they are born into a poor, middle-class or upper-class family, which is when relative intergenerational mobility will decline. Further increases in national income can reverse this trend and increase intergenerational mobility levels when countries invest a share of the higher national incomes into public interventions that will partly compensate for inequalities in private investments.

Beyond national income levels, we identify a number of country characteristics that are correlated with intergenerational mobility. Countries with higher rates of mobility on average report (i) higher tax revenues and rates of government expenditures, especially on education, (ii) better child health indicators (less stunting and lower infant mortality), (iii) higher school quality (more teachers per pupil and lower school drop-outs), and (iv) less residential segregation.

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Appendix A: Alternative measures of absolute and relative mobility

In this section we consider the robustness of our main results to two further measures of absolute mobility and relative mobility.

With regards to absolute mobility, first, we look at the mean change in years of schooling conditional on respondents' parents not having tertiary education (denoted by *DIF*). This measure can distinguish between a country where respondents only marginally improve upon the outcomes of their parents from a country that experiences vast improvements. Second, we consider a measure (denoted by *MIX*) that does not condition on parents being in the top category. Rather, we consider respondents mobile if they are in a higher educational category than their parents, or if they have obtained a tertiary degree.

We consider the following two alternative measures of relative mobility: (a) the share of individuals who make it to the top quarter in terms of years of schooling of their generation out of those who were born to parents who ranked in the bottom half of their generation (denoted by *BHQ4*), and (b) the expected rank of an individual in the education distribution whose parents rank in the bottom half of the parent education distribution (denoted by *MU050*).

The coarseness of data on education (in particular the large share of parents in developing countries with zero years of schooling) poses a challenge for the estimation of BHQ4 and MU050. These measures require that each parent can be ranked and assigned to the bottom half of the national distribution. When many parents have completed the same years of schooling, a method to break ties is needed to assign parents to the bottom 50 percent. This issue occurs more often in poor countries and among older cohorts, where it is not uncommon for a majority of parents to have completed zero years of schooling.

We consider two ways of breaking ties. The first method breaks ties by randomly assigning parents with identically low levels of education to the bottom 50 percent. We take 50 random draws, estimate *BHQ4* and *MU050* for each draw, and use the average estimate as the final point estimate. Suppose that two-thirds of parents have no education. If each of their offspring face identical odds of completing a degree, i.e. assuming that all of these parents are identical in terms of the prospects for their children's educational success, then it should not matter which of these parents are assigned to the bottom half of their generation. In that case, each of the 50 replications will be identical in expectation.

However, parents coded with the same level of education may vary in their true (unobserved) educational outcomes, if for example the quality of education varies, or because the survey only distinguishes between coarse educational categories. In that case, children with parents observed to have the same educational outcome would perform differently in expectation. The second method, put forward by Asher et al. (2019), derives upper and lower bounds on rank-based

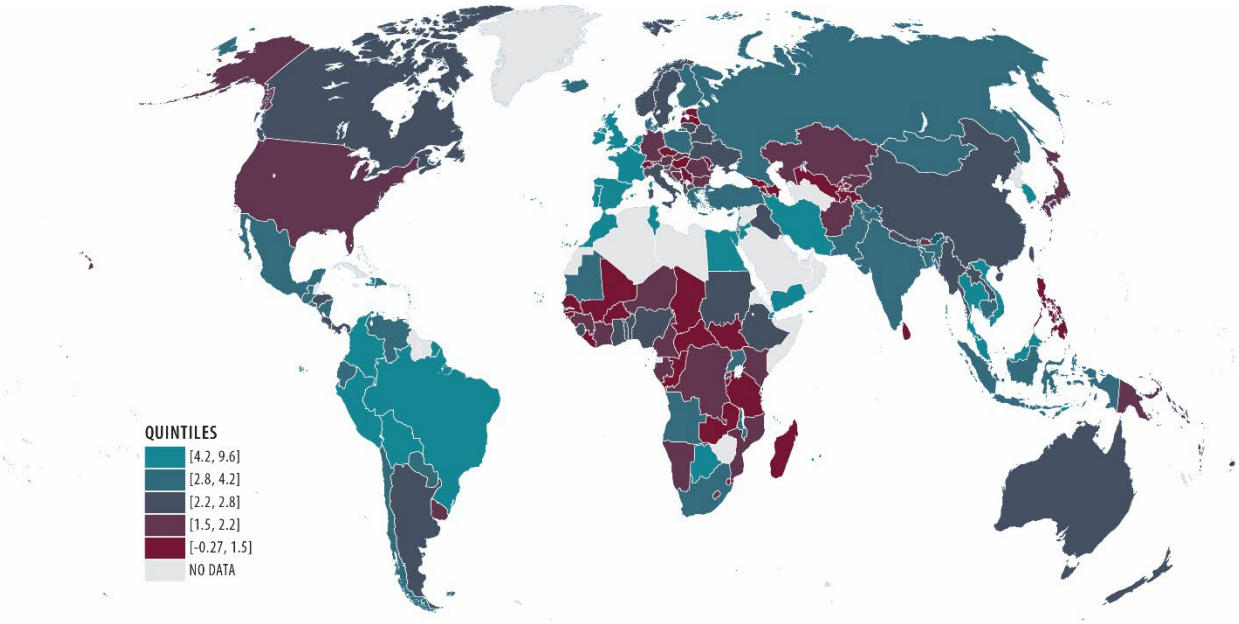
mobility measures such as *BHQ4* and *MU050* that capture the ambiguity from the inability to unambiguously rank parents in terms of their true education.[16]

Our preferred estimates of *BHQ4* and *MU050* combine the point estimate obtained by random assignment and the bounds obtained by the Asher et al. (2019) approach. Specifically, our estimate equals the point estimate if it falls in between the bounds. If the point estimate exceeds (falls below) the upper (lower) bound, then the upper (lower) bound is taken as our estimate.

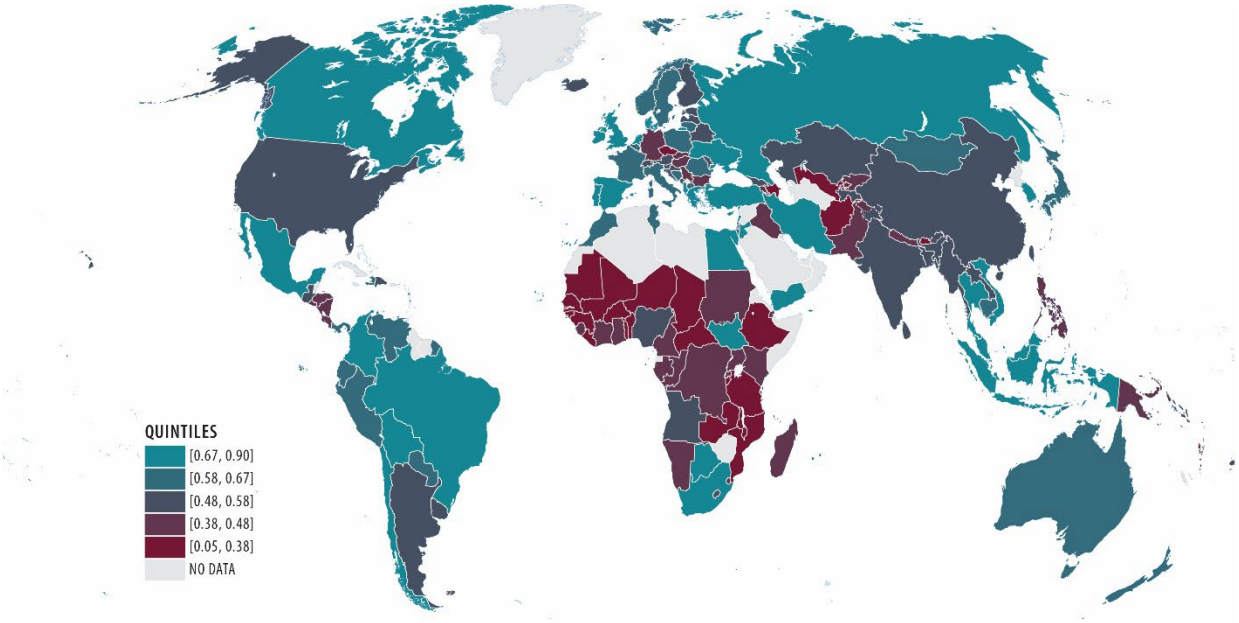
[16] In more detail, Asher et al. (2019) assume that the observed level of education is an interval-censored measure of a continuous latent education rank. With a couple of assumptions, such as children's rank being weakly increasing in parent's rank and a curvature constraint governing how fast the slope of children's rank as a function of parent's rank can change, they provide analytical bounds on the expected rank (or other outcome) of a child as a function of their parents' rank. From this, they can generate analytical bounds on the rank-based measures of intergenerational mobility we consider here.

Figure A.1: Absolute mobility around the world with alternative measures

a. Absolute mobility (DIF)



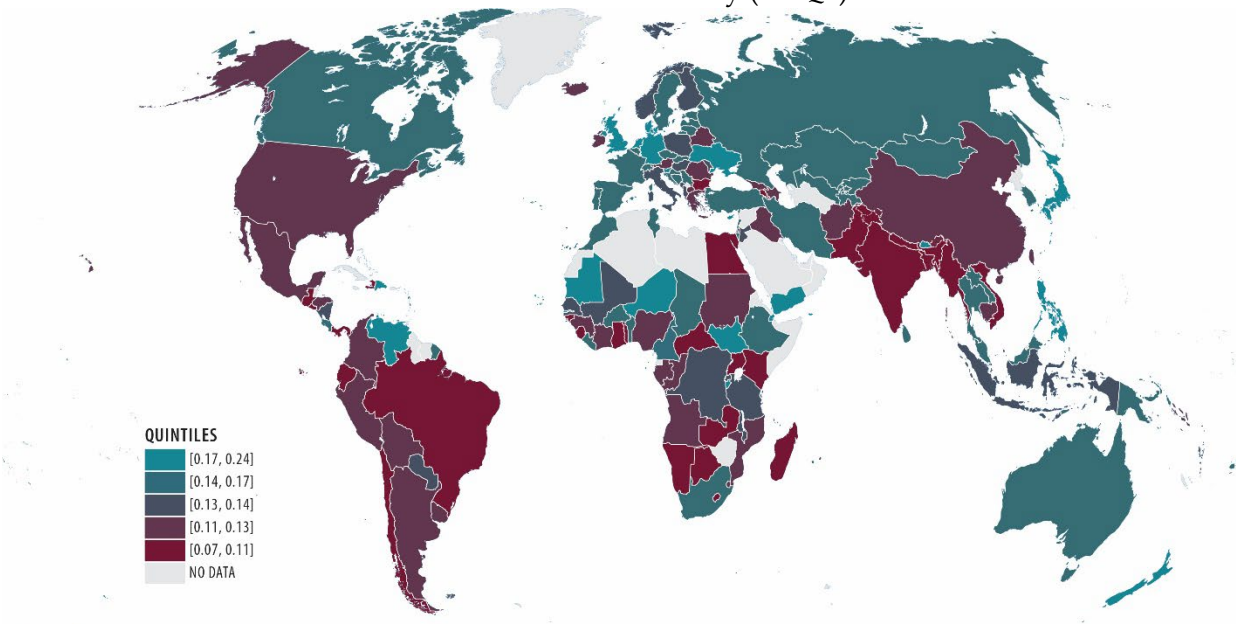
b. Absolute mobility (MIX)



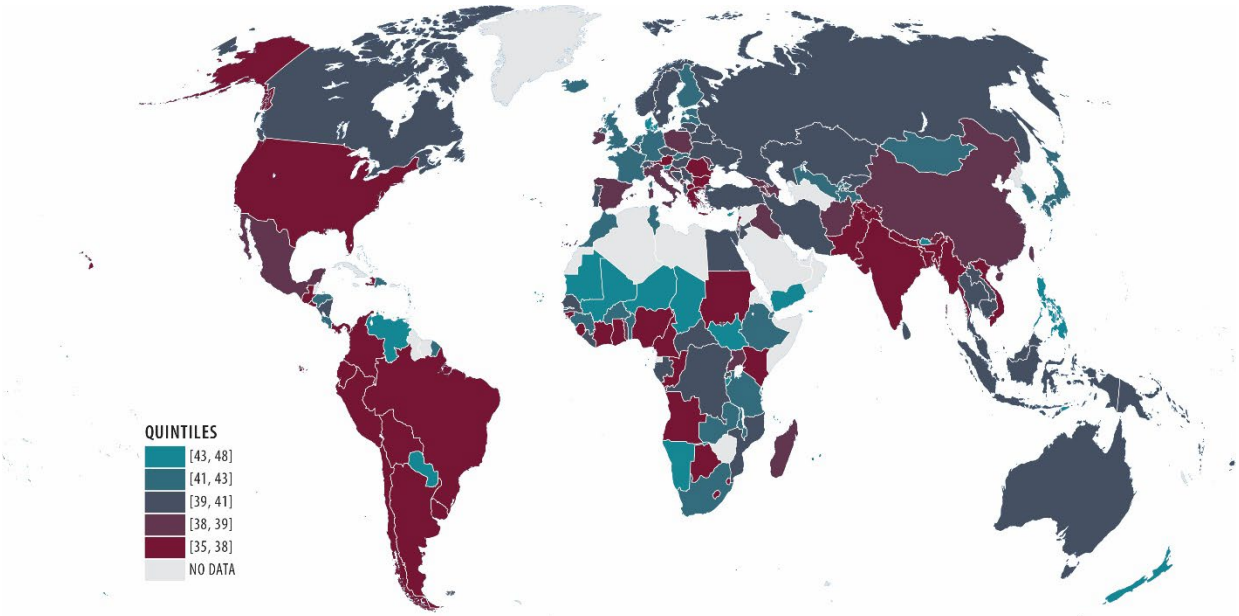
Note: The maps capture absolute mobility for individuals born in the 1980s. Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. The color-coding on these maps for Taiwan, China represents the data values for China which are 2.4 for DIF and 0.57 for MIX. The data values for Taiwan, China are 5.1 for DIF and 0.92 for MIX.

Figure A.2: Relative mobility around the world with alternative measures

a. Relative mobility (BHQ4)

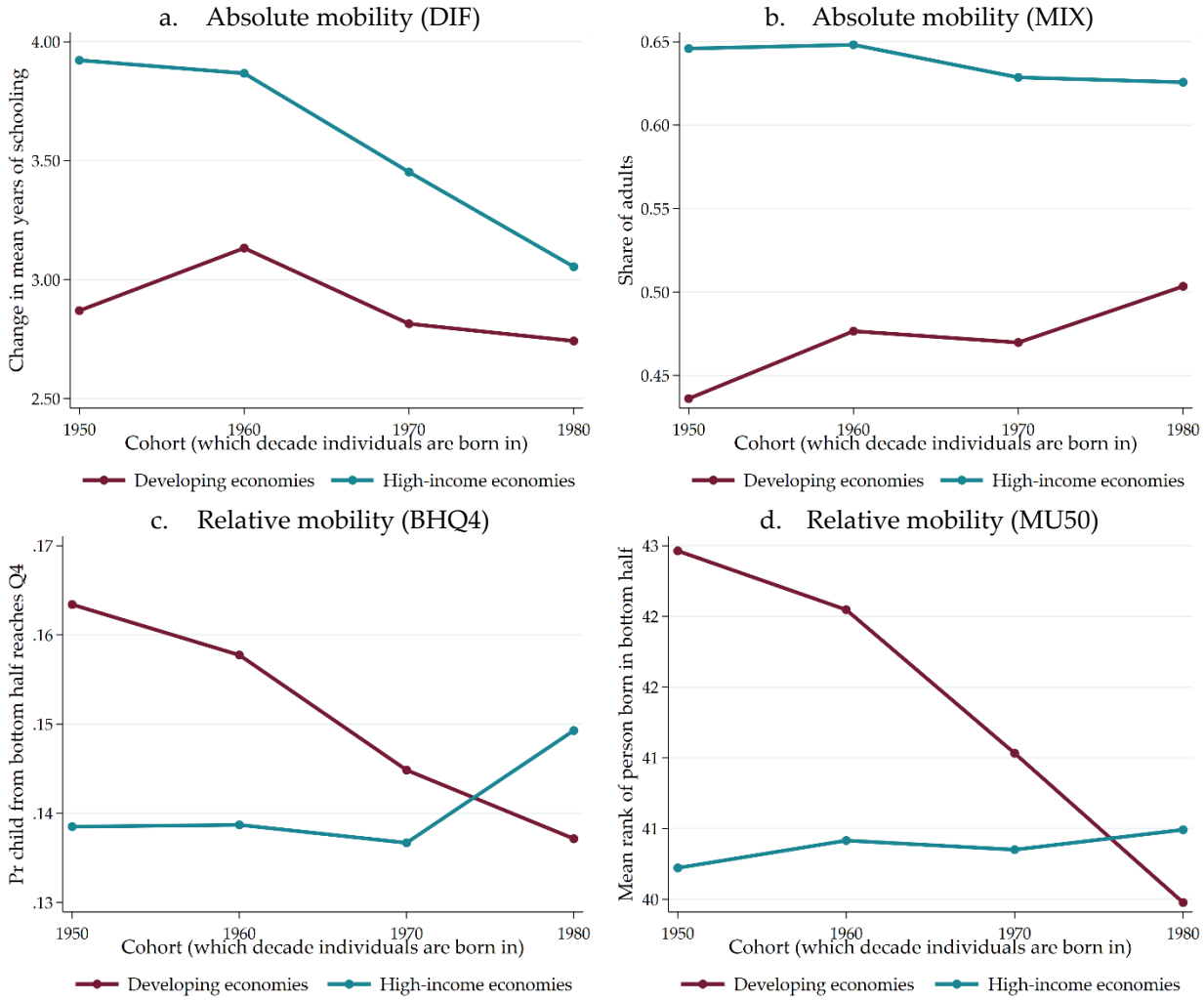


b. Relative mobility (MU50)



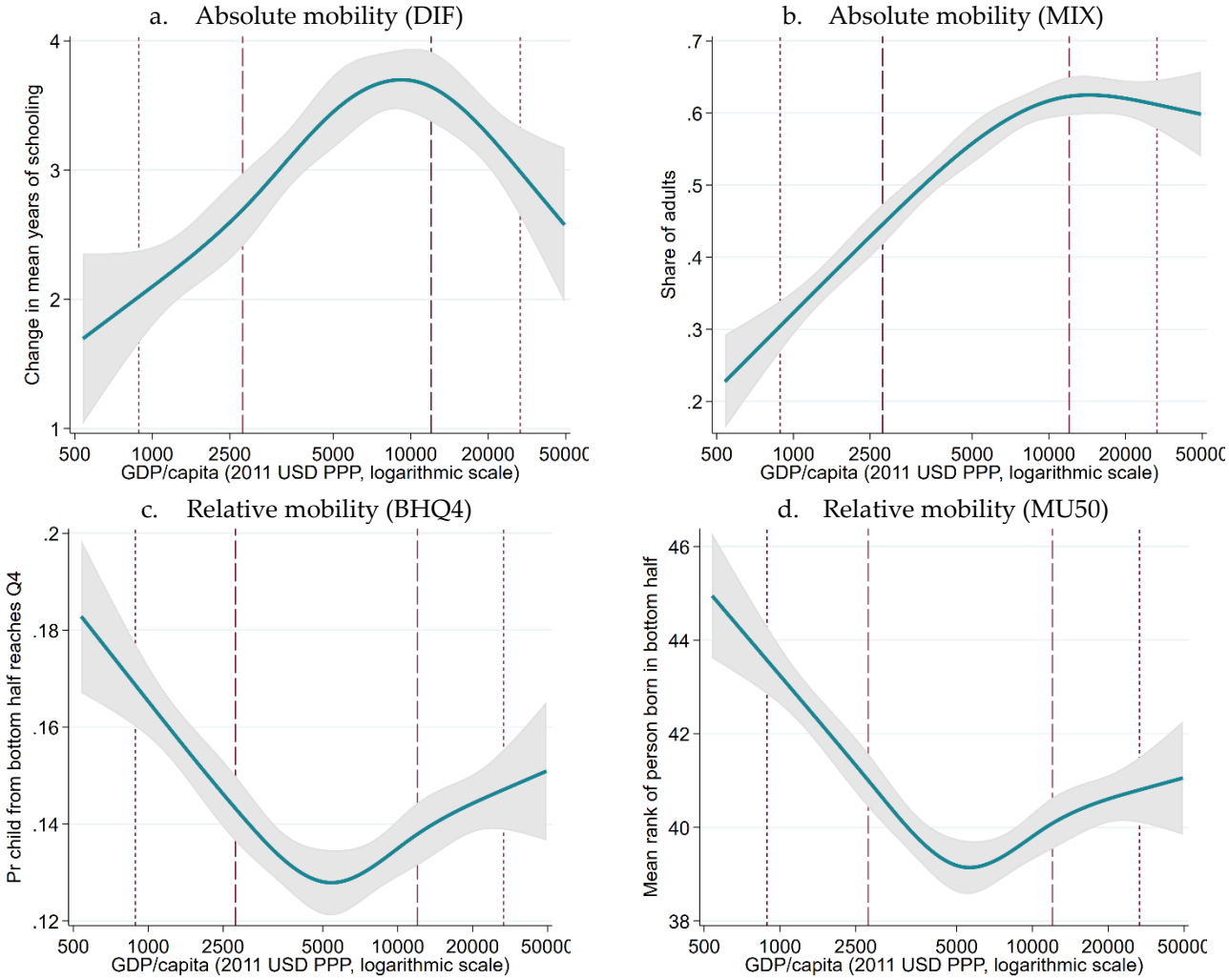
Note: The maps capture relative mobility for individuals born in the 1980s. Economies are classified according to quintiles of the mobility measure. A higher value indicates greater mobility. The color-coding on these maps for Taiwan, China represents the data values for China which are 0.12 for BHQ4 and 38 for MU50. The data values for Taiwan, China are 0.16 for BHQ4 and 40 for MU50.

Figure A.3: Absolute and relative mobility over time with alternative measures



Note: The figure shows non-population weighted average intergenerational mobility estimates.

Figure A.4: Absolute and relative mobility vs. GDP per capita with alternative measures



Note: The dashed lines indicate the 25th and 75th percentile of the distribution of GDP per capita. The dotted lines indicate the 5th and 9th percentile. GDP data is from the World Development Indicators, supplemented with data from the Maddison project where necessary. We match a cohort with the GDP per capita when the cohort, on average, was about to enter school. For example, the cohort born in the 1980s, we match with the GDP per capita from 1990, at which point the cohort on average was five years old.

Appendix B: Surveys used

Table B.1: Surveys used

Region	*Survey*	*Sample*
East Asia & Pacific		
Cambodia	CSES (2012)	Co-residents only
China	CFPS (2012)	Full sample
Fiji	HIES (2008)	Co-residents only
Indonesia	IFLS (2014)	Full sample
Kiribati	HIES (2006)	Co-residents only
Lao PDR	STEP (2012)	Full sample
Malaysia	KMS (2015)	Full sample
Mongolia	LITS (2016)	Full sample
Myanmar	MPLCS (2015)	Co-residents only
Papua New Guinea	HIES (2009)	Co-residents only
Philippines	ISSP (1999), FIES (2012)	Full sample until 1980s, co-residents only for 1980s
Solomon Islands	HIES (2013)	Co-residents only
Thailand	SES (2012)	Co-residents only
Timor-Leste	LSMS (2007)	Full sample
Tonga	HIES (2009)	Co-residents only
Tuvalu	HIES (2010)	Co-residents only
Vanuatu	HIES (2010)	Co-residents only
Vietnam	STEP (2012)	Full sample
Europe & Central Asia		
Albania	LITS (2016)	Full sample
Armenia	LITS (2016)	Full sample
Azerbaijan	LITS (2016)	Full sample
Belarus	LITS (2016)	Full sample
Bosnia and Herzegovina	LITS (2016)	Full sample
Bulgaria	ESS (2012)	Full sample
Georgia	LITS (2016)	Full sample
Kazakhstan	LITS (2016)	Full sample
Kosovo	LITS (2016)	Full sample
Kyrgyz Republic	LITS (2016)	Full sample
Moldova	LITS (2016)	Full sample
Montenegro	LITS (2016)	Full sample
North Macedonia	LITS (2016)	Full sample
Romania	LITS (2016)	Full sample
Russian Federation	ESS (2016)	Full sample
Serbia	LITS (2016)	Full sample
Tajikistan	LITS (2016)	Full sample
Turkey	LITS (2016)	Full sample
Ukraine	ESS (2012)	Full sample
Uzbekistan	LITS (2016)	Full sample
Latin America & Caribbean		
Argentina	LATINOBAROMETRO (2017)	Full sample

Bolivia	EH (2008)	Full sample
Brazil	PNAD (2014)	Full sample
Colombia	ENCV (2013)	Full sample
Costa Rica	LATINOBAROMETRO (2017)	Full sample
Dominican Republic	LATINOBAROMETRO (2017)	Full sample
Ecuador	ECV (2013)	Full sample
El Salvador	LATINOBAROMETRO (2017)	Full sample
Guatemala	ENCOVI (2014)	Full sample
Haiti	ECVMAS (2012)	Co-residents only
Honduras	LATINOBAROMETRO (2017)	Full sample
Mexico	EMOVI (2011)	Full sample
Nicaragua	LATINOBAROMETRO (2017)	Full sample
Paraguay	LATINOBAROMETRO (2017)	Full sample
Peru	ENAHO (2014)	Full sample
Venezuela, RB	LATINOBAROMETRO (2017)	Full sample
Middle East & North Africa		
Djibouti	EDAM (2017)	Full sample
Egypt, Arab Rep.	ELMPS (2012)	Full sample
Iran, Islamic Rep.	HEIS (2014)	Co-residents only
Iraq	IHSES (2012)	Full sample
Jordan	JLMPS (2010)	Full sample
Lebanon	HBS (2011)	Co-residents only
Morocco	ENNVM (2006)	Full sample
Tunisia	TLMPS (2014)	Full sample
West Bank and Gaza	PECS (2011)	Co-residents only
Yemen, Rep.	HBS (2014)	Co-residents only
South Asia		
Afghanistan	NRVA (2011)	Co-residents only
Bangladesh	HIES (2010)	Co-residents only
Bhutan	LSS (2003)	Full sample
India	IHDS (2011)	Full sample
Maldives	HIES (2009)	Co-residents only
Nepal	LSS (2011)	Full sample
Pakistan	IHS (1991), PIHS (2013)	Full sample until 1980s, co-residents only for 1980s
Sri Lanka	STEP (2012)	Full sample
Sub-Saharan Africa		
Angola	IBEP-MICS (2008)	Co-residents only
Benin	EMICOV (2011)	Full sample
Botswana	BMTHS (2015)	Co-residents only
Burkina Faso	ECVM (2009)	Co-residents only
Burundi	ECVM (2013)	Full sample
Cabo Verde	QUIBB (2007)	Co-residents only
Cameroon	ECAM-III (2007)	Co-residents only
Central African Republic	ECASEB (2008)	Co-residents only
Chad	ECOSIT-III (2011)	Co-residents only
Comoros	EESIC (2014)	Full sample

Congo, Dem. Rep.	E123 (2012)	Full sample
Congo, Rep.	ECOM (2011)	Co-residents only
Côte d'Ivoire	ENV (2008)	Co-residents only
Eswatini	HIES (2009)	Co-residents only
Ethiopia	LSMS-ISA (2013)	Full sample
Gabon	EGEP (2017)	Full sample
Gambia, The	IHS (2015)	Full sample
Ghana	GLSS (2012)	Full sample
Guinea	EIBEP (2002), ELEP (2012)	Full sample until 1980s, co-residents only for 1980s
Guinea-Bissau	ILAP-II (2010)	Co-residents only
Kenya	STEP (2013)	Full sample
Lesotho	HBS (2017)	Co-residents only
Liberia	HIES (2014)	Full sample
Madagascar	ENEMPSI (2012)	Full sample
Malawi	LSMS-ISA (2013)	Full sample
Mali	LSMS-ISA (2014)	Full sample
Mauritania	EPCV (1995), EPCV (2008)	Full sample until 1980s, co-residents only for 1980s
Mauritius	HBS (2012)	Co-residents only
Mozambique	IOF (2008)	Co-residents only
Namibia	NHIES (2015)	Co-residents only
Niger	LSMS-ISA (2014)	Full sample
Nigeria	LSMS-ISA (2012)	Full sample
Rwanda	EICV (2000), EICV-IV (2013)	Full sample until 1980s, co-residents only for 1980s
Senegal	ESPS-II (2011)	Co-residents only
Sierra Leone	SLIHS (2011)	Co-residents only
South Africa	NIDS (2014)	Full sample
South Sudan	NBHS (2009)	Co-residents only
Sudan	NBHS (2009)	Co-residents only
São Tomé and Principe	IOF (2010)	Co-residents only
Tanzania	LSMS-ISA (2012)	Full sample
Togo	QUIBB (2015)	Full sample
Uganda	LSMS-ISA (2014)	Full sample
Zambia	LCMS-VI (2010)	Co-residents only
High-income economies		
Australia	HILDA (2015)	Full sample
Austria	ESS (2016)	Full sample
Belgium	ESS (2016)	Full sample
Canada	CGSS (2014)	Full sample
Chile	CASEN (2013)	Full sample
Croatia	LITS (2016)	Full sample
Cyprus	ESS (2012)	Full sample
Czech Republic	ESS (2016)	Full sample
Denmark	ESS (2014)	Full sample
Estonia	ESS (2016)	Full sample
Finland	ESS (2016)	Full sample
France	ESS (2016)	Full sample

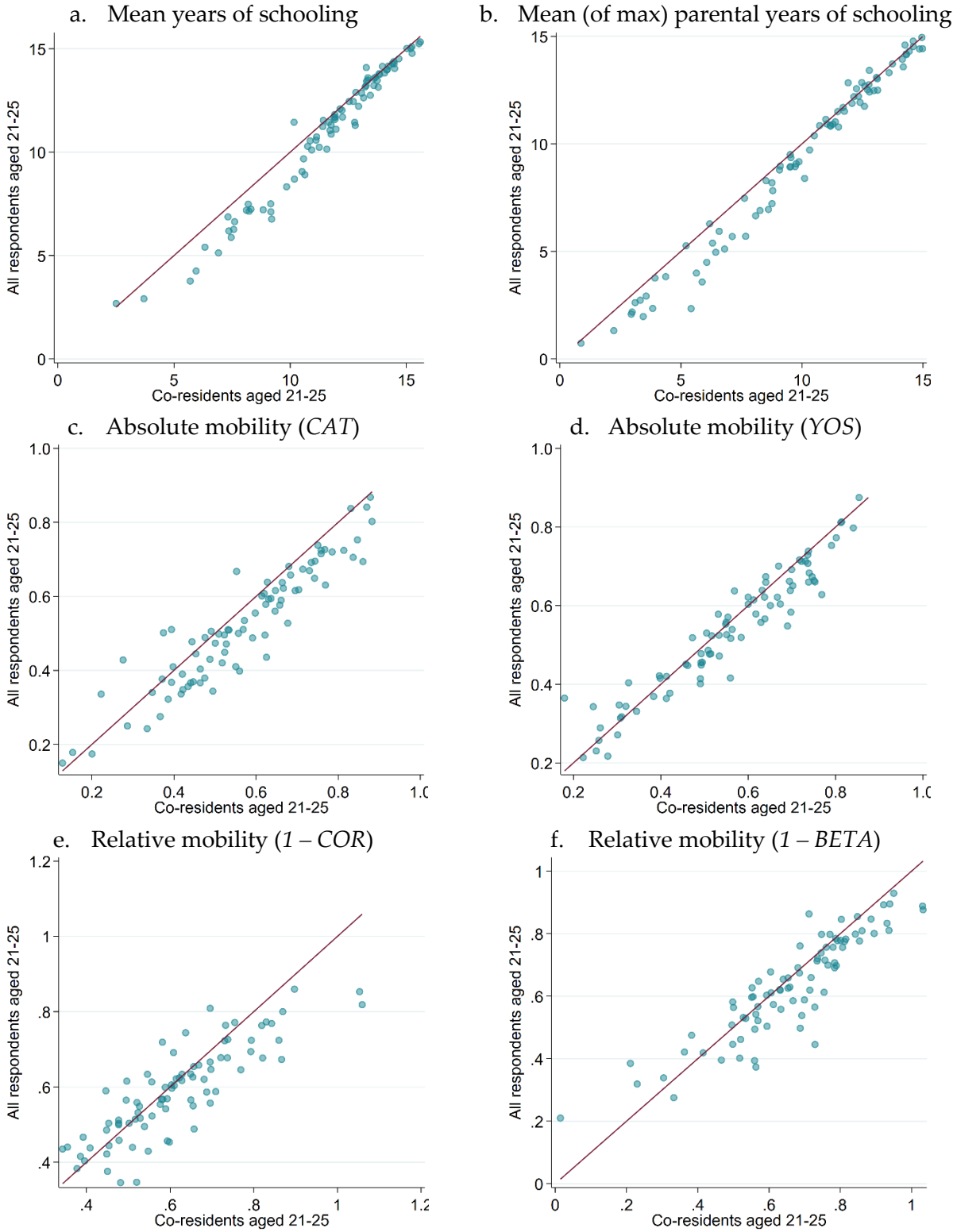
Germany	ESS (2016)	Full sample
Greece	LITS (2016)	Full sample
Hungary	ESS (2016)	Full sample
Iceland	ESS (2016)	Full sample
Ireland	ESS (2016)	Full sample
Israel	ESS (2016)	Full sample
Italy	LITS (2016)	Full sample
Japan	JGSS (2012)	Full sample
Korea, Rep.	KLIPS (2014)	Full sample
Latvia	LITS (2016)	Full sample
Lithuania	ESS (2016)	Full sample
Netherlands	ESS (2016)	Full sample
New Zealand	ISSP (1999)	Full sample
Norway	ESS (2016)	Full sample
Panama	ENV (2008)	Full sample
Poland	ESS (2016)	Full sample
Portugal	ESS (2016)	Full sample
Slovak Republic	ESS (2012)	Full sample
Slovenia	ESS (2016)	Full sample
Spain	ESS (2016)	Full sample
Sweden	ESS (2016)	Full sample
Switzerland	ESS (2016)	Full sample
Taiwan, China	TSCS (2015)	Full sample
United Kingdom	ESS (2016)	Full sample
United States	PSID (2015)	Full sample
Uruguay	LATINOBAROMETRO (2017)	Full sample

Note: For some social surveys we pool multiple waves. The table lists the year of the last wave used.

Appendix C: Testing for co-residence bias

Surveys with retrospective data on parental education can be used to quantify the magnitude of the co-residency bias by estimating mobility with and without only relying on co-residents. A comparison of estimates obtained for co-residents aged 21-25 against estimates for all respondents aged 21-25 is shown in Figure C.1. The mean years of schooling of co-residents (the parents of co-residents) is slightly higher than the mean years of schooling of all respondents (the parents of all respondents). Comparing estimates of absolute mobility suggests that rates are slightly higher for co-residents, particularly when *CAT* is used. With regards to relative mobility, using *1-BETA* also suggests that estimates are slightly higher for co-residents. There is some evidence in favor of estimates based on only co-residents being slightly overestimated for high values of relative mobility and slightly underestimated for low values of relative mobility, particularly when using *1-COR*. Still, the two estimates appear highly correlated, and the size of the bias does not seem to be large enough to generate notable re-rankings.

Figure C.1: Comparing co-residents (aged 21-25) with all respondents (aged 21-25)



Note: The figures show country-level estimates of mean years of schooling and estimates of intergenerational mobility for all respondents aged 21-25 and for respondents aged 21-25 who reside with both of their parents. The red lines are 45-degree lines.