Relative Intergenerational Mobility, a global review

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Abstract

The paper analyzes relative social mobility, through intergenerational persistence, using economies of all income levels and regions of the world. This concept is studied in an income and educational dimension using a cross-sectional and cohort approach, with a homogeneous methodology that adds value to works that have studied this with countries around the world. The results show that social mobility is higher in high-income countries, and that the region with the highest intergenerational persistence is South Asia. The statistical and economic significance of our regressions depends on the dimension and approach analyzed, but all have the expected sign and high goodness of fit. These same data could be used to estimate social mobility with other parameters and filters.

Keywords: Social Mobility, Intergenerational Persistence, Inequality
JEL Codes: D3, I2, J3

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1 Introduction

Let's suppose for a moment that there are two identical young people in their observable and non-observable characteristics. One of them was born in a wealthy sector of society, and the other in a humble environment. What will be the relative position of these people in the income or educational distribution when they are older? If these people end up far apart from each other, it means that there was an unequal endowment of variables such as upbringing, investment in human capital, or networking that affected their success in reaching a better position in the social distribution.

This paper seeks to answer to what degree this would occur in countries around the world, by calculating intergenerational persistence, which measures the transmission of parental factors to children's outcomes.

The answer to this question would make it possible to roughly quantify the degree of equal opportunities in a society and the most relevant generational transmission factors.

Through a homogeneous proposal of estimates, we seek to contribute to two works developed by the World Bank on this matter in the educational and income dimension, with a cross-sectional and cohort approach.

Our results point to greater social mobility in high-income economies and to the relevance of macroeconomic variables such as government spending on education or inequality in the economy as intergenerational transmission mechanisms.

The rest of the paper is structured as follows. In section 2 we will talk about why it is important to study this topic from a normative and positive point of view. In section 3 we will discuss the literature that has worked on relative social mobility using countries around the world, pointing out the aspects in which we will add value to what has been written so far. In section 4 we state what are the two research questions we seek to answer in this paper along with their hypothesis. In section 5 we go into detail about the data we have available and how we use them to construct the results. In section 6 we explain the empirical part of the paper in all its aspects. The estimators we use, the filters of observations and surveys implemented and we explain the two approaches to estimation. We conclude the section by explaining the two sources of selection bias we face along with the solutions we use to mitigate them. In section 7 we present descriptive statistics for different variables at the aggregate level by income level and by geographic region of the world. In section 8 we present the results of the research in its two dimensions and approaches. In section 9 we present the conclusions of the work along with ideas to expand on the evidence found so far.

2 Motivation

We can understand relative intergenerational mobility as the posibility of people to move from one relative position in the education/income distribution to another across generations. A society without relative intergenerational mobility is one in which the same people systematically end up in the same position in the distribution. The most extreme case would be a caste society in which no matter how much talent or potential you have, you will always end up in the place where you were born because you are not allowed to move up the social ladder. The same logic applies in the reverse direction

With this in mind, we can summarize the reasons for estimating relative intergenerational mobility in two types:

1) **Normative reasons**: There are economic/social differences due to factors that individuals can control, such as their effort, responsibility, choices, etc. But there are other exogenous factors that individuals do not control and that limit their opportunities to develop their life projects such as, a safe neighborhood, a good contact network, education and health of quality, among other things which are typically transmitted through parental schooling and income, along with a series of government public policies.
There is broad consensus that public policy must generate the necessary conditions for the existence of *'equality of opportunities'*. This concept can be thought as the possibility that individuals have to realize their life projects. A society in which there are equality of opportunities is one in which circumstances do not determine the results and that therefore, the results however unequal they may be, would come from a fair process.

2) **Economic Reasons**: If there is equality of opportunity, and talents are spread throughout society, we should expect the relative position of individuals in the income/education distribution to change across generations. In reality, since there is not full equality of opportunity, much talent and ability is wasted as they are unable to realize their full potential, leading to an inefficient allocation of resources in the economy. If people feel that there is not a strong degree of equality of opportunity, this can impact on the effort given by people in the lower tail of the distribution as they feel that their efforts will be wasted and that their children's generation will end up relatively close to where they ended up. The same logic can be applied to the upper tail of the distribution.

3 Literature Review

There are many papers that have studied this issue, in different time windows, with different methodologies and data.

To date, there are only two publications, conducted by the World Bank, that have studied intergenerational mobility with countries of all income levels, and from all regions of the world. In this work more data are available, and the results will be presented using the same methodology without the need to mix our own results with those of other authors. Additionally we will perform an analysis using rank-rank measures, which has been shown by Chetty et.al (2014) to be a more robust estimator. We will also perform a cross section analysis using the year in which the survey was conducted, together with a cohort analysis. Finally, we will try to quantify the direction and significance of different variables in intergenerational persistence. This is summarized and detailed in the following table.

Table 1

	Van der waide et.al		**This Work**	
	2021 (Education)	2018 (Education & Income)	Education	Income
Surveys	<500	<650	1285	669
Methodology	IV & Coresidents	IV & Coresidents	Coresidents	Coresidents
Approach	Cohort	Cohort	Cohort + Cross Section	Cross Section*
Estimations	Level	Level	Level & Range	Level & Range
Mix of results	Yes	Yes	No	No
Macro Quantification	No	No	Yes	Yes

Surveys: This would be the first study to have such a large coverage of surveys for countries around the world. No surprises are expected, we expect the results to be in line with existing literature. It should be noted that these surveys were chosen after applying a series of filters, which are detailed in later sections of this paper. The distribution of surveys and countries over time can be found in the appendix section. The number of surveys indicated corresponds to the lower bound of surveys we would have using a particular estimator. Another estimator may have more surveys than those indicated in the table.

Methodology: The works of Van der Waide et al. first estimates relative intergenerational mobility using "retrospective questions" to the son to obtain information from the father. For example, it is possible to estimate mobility in education if the son reports how many years of education his father has, as this is fairly straightforward to achieve. On the other hand, income is difficult to report accurately, so if the son does not have this information from his father, it would be possible to estimate how much it would be, using instrumental variables based on the information provided by the son. In the case of not having this type of data, the authors use the coresidents methodology, which allows obtaining information from parents and children living in the same household. In our work we use only the latter methodology, which allows us to obtain more comparable results than if different ways of estimating the same thing were used.

Approach: The works of Van der Waide et.al uses a cohort approach. This allows to know how relative mobility has evolved over different generations (using the year of birth of in-

dividuals). For the education dimension we do the same, but in addition we add a cross section approach, which allows us to see how relative mobility has evolved over different moments in time (every moment captures people with different dates of birth). We do the same for the income dimension, which allows us to generate a richer analysis of the phenomenon under study. *It is worth mentioning that for the income dimension we will concentrate primarily on the cross-section approach, because we encountered many difficulties when programming the codes in the cohort approach.

Estimates: Chetty et.al, 2014 studying relative social mobility in the United States used rank measures noting that they are a more robust way of estimating relationships between variables. In this paper we estimate relative mobility in the traditional way by level, but we also add rank estimates using *spearman correlation*. This would allow us to generate robustness analyses of the results found.

Mixing of results: The work of Van der Waide et.al shows results from different sources, the main one being Global Database on Intergenerational Mobility (GDIM) and the "Equalchances" database. The problem is that they do not document in detail the functional form of the regressions, or the filters of observations they used. It is possible that when presenting the results, they do so by mixing these methodologies, which is not ideal. In this paper we will estimate the results ourselves, using the same functional form and filters in each and every survey, without mixing results from other studies.

Macro Quantification: In this paper we generate regressions to assess the statistical and economic significance of key variables that attempt to explain intergenerational persistence in economies around the world.

4 Research Questions

This paper seeks to answer two questions

1) **How has intergenerational persistence in education and income behaved historically by cohort and survey years?**

With this we seek to get a better idea of whether persistence is concentrated in countries with a certain level of income or in certain regions of the world, analyzing the trend over time.

2) **How does intergenerational persistence correlate globally, with key variables from different models that attempt to explain it?**

With this question **we do not seek to present causal evidence** as this requires a deeper analysis that is beyond the scope of this study. What we seek is to shed some light on whether the data has any relationship with variables that attempt to explain intergenerational persistence with countries around the world. The hypothesized relationship between intergenerational persistence and the variables is summarized in the following table.

Table 2

Variables	**Model/Study**	**Hypothesis**
Inequality (Gini Coefficient)	Corak (2013)	Positive
Public Education Spending	Mayer & Lopoo (2007)	Negative
Economic Liberalization	Xie & Chang (2022)	Negative

5 Data

The ideal data to generate this type of work are long panel data that track parents and children in their income history and years of schooling. These type of data are extremely expensive to collect, and if they exist at all, they are typically concentrated in developed world countries.

We have three data sources:

1) International Income Distribution Database (I2D2): In an effort to generate international evidence on different matters, the World Bank generated standardized databases from household and labor market surveys in countries around the world for over a decade. The databases covers economies from developed and developing regions. There is no censoring of any kind in the survey selection. Not all of economy/year/survey points are included in our analysis because some surveys lack key variables. If a survey was available and has all the needed variables, then it was included. A fundamental requirement for a survey to be part of this source is that it must be nationally representative. It should be noted that for a given economy/year, there could be more than one estimate. This is because for that economy/year, there is more than one survey available, or that the same survey is available more frequently than annually. It should be mentioned that many of these databases are not open to the public. This is why in a joint work with Claudio Montenegro we generated the necessary estimates for this research, maintaining the confidentiality of the information at all times. A total of 2,308 surveys are available in this data source. After applying a series of filters explained in the empirical approach section, 911 surveys were finally used in the education dimension and 474 in the income dimension.

2) Luxemburg Income Study (LIS): Surveys from this source are nationally representative. More up-to-date income data is available, especially for rich countries, with more developing countries recently included. These data are more public, can be requested for transparency, but access is very limited. The opening is given by entering the server and putting the code to get the results that arrive via email. A total of 728 surveys are available in this data source. 374 surveys were used in the education dimension and 195 surveys were used in the income dimension.

3) Quality of Governance (Teorell et.al, 2023): In order to find correlational evidence at the international level between our estimates and macroeconomic variables of the countries, we will use this database. The data have observations that are country-year combinations, which are collected from international organizations such as the World Bank, the International Monetary Fund, among others. This data is open to the public.

* World Bank Country and Lending Groups: To classify countries by income level and geographic region, we use a World Bank classification updated to the year 2022. The income classification has 4 categories; High income, Low income, Upper middle and Lower middle (the only country that cannot be classified was Venezuela, since the data provided is not reliable for the World Bank). The region classification has 7 categories; East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, North America, South Asia and Sub-Saharan Africa. The list of countries in each category can be found in the appendix section.

6 Empirical Approach

To measure social mobility across countries, we will use a cross-section approach and a cohort approach.
To calculate the social mobility of the different economies we will use 4 measures. Pearson correlation, Spearman correlation, Ordinary least squares regression and Heckman maximum likelihood. This last measure is only applied in the income dimension and is explained in detail in the selection bias subsection.

The Pearson correlation measures the degree of linear association between two variables in level. On the other hand, Spearman's correlation measures the degree of association between two variables in a non-linear way since it treats the data using the rank they have. Both measures give a value that is bounded between -1 and 1 (Cauchy-Schwarz inequality) and we will use them as a measure of robustness. A mathematical representation of both measures is given in the appendix section.

Ordinary least squares regression typically has the following functional form

$$y_s = \alpha + \beta y_f + \gamma X + \epsilon_i$$

Where per survey or cohort we have:
y_s=ln(Children's income) or Children's Education
y_f=ln(Father's income) or Father's Education
X=Control variables. Following the methodology of Solon (1992) we used age and age squared as control variables to control for the life cycle of the children and the fathers (in the income dimension)

There is a well-known relationship between the regression coefficient (β) and the pearson correlation (ρ). The demonstration of this relationship can be found in the appendix section.

$$\beta = \rho \frac{\sigma_s}{\sigma_f}$$

In simple, this relationship tells us that the regression coefficient is sensitive to the inequality that exists in the income/schooling distribution, so correlation measures are appropriate robustness instruments.

Let's use an example to better understand the relationship between social mobility and the beta coefficient. Suppose that a parent is 10% above the average income of his generation and that the beta of the regression is equal to 0.5. That means that on average the children's generation will be 5% (10% * 0.5) above the mean of their generation.
If we keep the relative position of the father, but now the value of the coefficient is 1, it means that on average the children will be 10% (10% * 1) above the mean income of their generation. This means that the relative position of the father and son in the income distribution remained constant from one generation to the next, which speaks of a complete lack of social mobility.

Therefore, the closer β (intergenerational persistence) is to 0, the greater the social mobility

6.1 Observation and survey filters

In order to keep the right observations and surveys, we performed a series of filters on the education and income dimensions. These filters are summarized in the following table and are detailed below:

Table 3

	Education	**Income**
Coresidents Son's Age	23-30	23-30
Semanal Working Hours	-	≥ 22
Father's Age	-	< 65
Exlusion top 0.5% of distribution	-	Yes
Control Variables	-	Son and father age
Surveys $\geq$ year 2000	Cross-Section Approach	Cross-Section Approach
Plausible estimates	[0.1 ; 0.8]	[0.1 ; 0.8]
Surveys: N° Obs Min & Max Median Error	200 y 0.2	100 y 0.2
N° Min Surveys per Cohort	2	2

1) Coresidents Son's Age: We believe that 23 years is a reasonable cut-off age for the coresident methodology, given that around this age people finish their tertiary education cycle and start entering the labor market. On the other hand, since the surveys are conducted 3 to 5 years per country, we decided to set the upper cutoff age at 30 years in order to see the effect that exists in a cohort at different ages and to limit the possible coresidence bias. If we analyze the coresidency and labor participation rates of people in this age group (see the appendix section), it is confirmed that this is an appropriate bracket.

2) Semanal Working Hours: In the income dimension, we seek to capture what is closest to people's permanent income, so we filter out observations that have 22 or more hours of work per week.

3) Father's Age: In the income dimension we seek to avoid a problem of selectivity of people leaving the labor market to retire. This was initially intended for men in Chile, but analyzing the retirement age for men in other countries, we consider it to be a good cut-off age.

4) Exlusion top 0.5% of distribution: For every survey, the top 0.5% of the income sample was eliminated. This is a World Bank practice to avoid possible biases due to wage outliers.

5) Control Variables: In the literature on intergenerational mobility there is the concept of "life-cycle bias". This bias occurs when calculating the intergenerational persistence of income of the father at a different age than that of the son. The solution given to solve this problem is to include as a control variable the age of the son and the age of the son squared. Some papers additionally include the father's age. Following the functional form proposed by Solon (1992), in this paper we will use the son and father age as control variables. In the educational dimension, this bias does not occur because once people obtain an educational level they do not drop out of it, so estimating the intergenerational persistence of parents and children at different ages should not present a problem.

6) Year 2000: We stayed with these surveys from the year 2000 for 3 reasons. First because there is a greater coverage of countries during those years. Second because after the fall of the Berlin Wall and the Soviet Union many countries were created and destroyed, in order to give them time to organize themselves and to collect quality data, we think that the year 2000 is a good cut-off year. Finally, it is evident that the coresidency rate has been increasing over time for the relevant age range, so taking the latest years available is something that is useful in our research to reduce coresidency bias. The latter can be seen graphically in found in the appendix section

7) Plausible estimates: We leave out surveys with relative mobility estimates less than 0.1 and greater than 0.8 since these extreme magnitudes have not been documented in the literature.

8) Surveys: Next, we excluded from the survey sample those surveys with a number of observations lower than 200 (educational dimension) or 100 (income dimension) for the calculation of the statistics of interest. The objective is to ensure that the results have not been distorted by sampling errors due to small sample sizes. We also excluded those with a deviation from the median of their country greater than 0.2 percentage points. A graph illustrating this can be found in the appendix.

9) Approach: We only take into account those cohorts that have a minimum of 2 surveys as observations in order to distinguish the age effect from the cohort effect.

To correctly capture the importance of the father's income in the children's income, we annualize the salaries to isolate the effect that the different frequencies with which each one receives it could have.

It is important to mention that the estimates for the income dimension are more challenging to obtain than for the educational dimension. Years of schooling once acquired are not lost over time, it is a fairly simple variable to report and there is no reason to think that measurement errors exist. Income, on the other hand, has a greater risk of measurement error; it can suffer transitory shocks that remain in our study window and significant fluctuations over time.

6.2 Cohort and Cross-Section approach

Figure 1: Cohort and Cross-Section Approach, Chilean Example

	2017	2015	2013	2011	2009	2006	2003	2000	1998	1996	1994	1992	1990	1987
1994	23	21	19	17	15	12	9	6	4	2	0	-2	-4	-7
1993	24	22	20	18	16	13	10	7	5	3	1	-1	-3	-6
1992	25	23	21	19	17	14	11	8	6	4	2	0	-2	-5
1991	26	24	22	20	18	15	12	9	7	5	3	1	-1	-4
1990	27	25	23	21	19	16	13	10	8	6	4	2	0	-3
1989	28	26	24	22	20	17	14	11	9	7	5	3	1	-2
1988	29	27	25	23	21	18	15	12	10	8	6	4	2	-1
1987	30	28	26	24	22	19	16	13	11	9	7	5	3	0
1986	31	29	27	25	23	20	17	14	12	10	8	6	4	1
1985	32	30	28	26	24	21	18	15	13	11	9	7	5	2
1984	33	31	29	27	25	22	19	16	14	12	10	8	6	3
1983	34	32	30	28	26	23	20	17	15	13	11	9	7	4
1982	35	33	31	29	27	24	21	18	16	14	12	10	8	5
1981	36	34	32	30	28	25	22	19	17	15	13	11	9	6
1980	37	35	33	31	29	26	23	20	18	16	14	12	10	7
1979	38	36	34	32	30	27	24	21	19	17	15	13	11	8
1978	39	37	35	33	31	28	25	22	20	18	16	14	12	9
1977	40	38	36	34	32	29	26	23	21	19	17	15	13	10
1976	41	39	37	35	33	30	27	24	22	20	18	16	14	11
1975	42	40	38	36	34	31	28	25	23	21	19	17	15	12
1974	43	41	39	37	35	32	29	26	24	22	20	18	16	13
1973	44	42	40	38	36	33	30	27	25	23	21	19	17	14
1972	45	43	41	39	37	34	31	28	26	24	22	20	18	15
1971	46	44	42	40	38	35	32	29	27	25	23	21	19	16
1970	47	45	43	41	39	36	33	30	28	26	24	22	20	17
1969	48	46	44	42	40	37	34	31	29	27	25	23	21	18
1968	49	47	45	43	41	38	35	32	30	28	26	24	22	19
1967	50	48	46	44	42	39	36	33	31	29	27	25	23	20
1966	51	49	47	45	43	40	37	34	32	30	28	26	24	21
1965	52	50	48	46	44	41	38	35	33	31	29	27	25	22
1964	53	51	49	47	45	42	39	36	34	32	30	28	26	23
1963	54	52	50	48	46	43	40	37	35	33	31	29	27	24
1962	55	53	51	49	47	44	41	38	36	34	32	30	28	25
1961	56	54	52	50	48	45	42	39	37	35	33	31	29	26
1960	57	55	53	51	49	46	43	40	38	36	34	32	30	27
1959	58	56	54	52	50	47	44	41	39	37	35	33	31	28
1958	59	57	55	53	51	48	45	42	40	38	36	34	32	29
1957	60	58	56	54	52	49	46	43	41	39	37	35	33	30

The table contains information from Chile's Casen surveys between the years 1987 and 2017. The first column corresponds to the cohort of the person, i.e. the year of his birth. The first row corresponds to the year of the survey. The values in the matrix correspond to the age in each cohort-survey year combination.
For example, in the 2017 Casen survey, sons in the 1984 cohort were 23 years old. Since we work with the sons who are between 23 and 30 years old, we can see marked in green color the boxes that show the evolution of the relevant bracket in the different cohort-survey-year combinations. This same exercise can be extrapolated to the rest of the economies.

When we obtain results of relative social mobility with the cross section approach, we are doing a column-by-column analysis. In each column we obtain how much is the average estimator for the relevant age bracket over different cohorts. When we get results with the cohort approach, we are doing a row-by-row analysis. In each row we get how much is the average estimator for the relevant age bracket across different surveys. The cohorts marked in red were eliminated for each economy, since in those cohorts we have less than two survey observations, which makes it impossible to distinguish the cohort effect from the age effect.

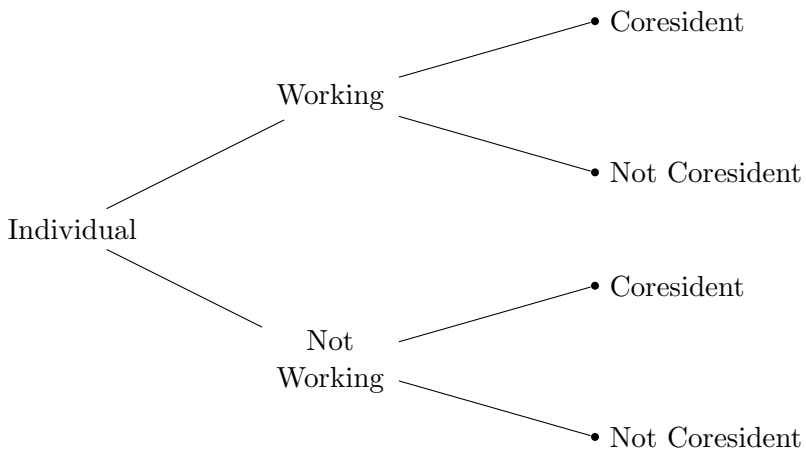
The cohort approach is one of the most widely used in the literature, since it allows us to see the evolution of social mobility according to the year of birth of individuals. When we use the coresidents methodology, this approach has the disadvantage of having few parent-child observations in case there are many years between one survey and another. For the

Chilean case illustrated in the appendix, this is not so serious since the surveys are 2 or 3 years apart. For other economies with 5 or more years between one survey and another this would represent a problem, since there would be less statistical power in obtaining social mobility coefficients.

6.3 Selection Bias

There are two sources of selection bias in this work. The first is whether the person participates in the labor market. The second is whether the person live with his or her parents. This can be seen in the following figure:

Figure 2: Selection Bias Sources



To attenuate the first selection bias we will focus only on the father-son combination, leaving aside the mother-son, father-daughter or mother-daughter combinations since female labor participation rate is lower than males.

In the following table, the impossibility of observing the salary is marked with a $\times$ and the possibility of seeing it in the database is marked with a $\checkmark$.

Table 4

		Son Wage	**Father Wage**
Working	Coresident	✓	✓
	Not Coresident	✓	×
Not Working	Coresident	×	×
	Not Coresident	×	×

First column: Regardless of whether the son lives with his father, we will be able to observe his salary as long as he participates in the labor market.

Second column: We can only observe the father's salary if two conditions are met. The father participates in the labor market and co-resides with his son. In the databases we have, it is not possible to know the salary (or even the schooling) if the son lives alone, since no questions are asked that provide information about his father, that is why we use the methodology of co-residents.

Since these father-son combinations are only observed with sons who live with their father, it is possible that there is a selection bias with respect to those sons who do not live with their fathers.

To take care of the second selection bias we will estimate by heckman maximum likelihood only for the income dimension since it has been documented that the coresident bias for education is marginal (Emran et.al, 2016 & Emran et.al, 2018).

If we consider the latent variable v_s^* as the benefit that the son obtains by living with his father, we will observe the sample only when $v_s^* > 0$, so we have the following

$$v_s^* = \gamma Z_s + \epsilon_s$$

$$v_s = \begin{cases} 1 & \text{if } \gamma Z_s + \epsilon_s > 0 \\ 0 & \text{if } \gamma Z_s + \epsilon_s \leq 0 \end{cases}$$

Where Z_s corresponds to a vector of variables that influence the son's decision to live or not with his father.

Taking into consideration the variables used in the works of Sanhueza (2011) and Morales (2014), together with the variables we have available in our surveys, we decided that the participation equation will be as follows.

$$Cores = \alpha + \beta ecivil + \gamma urban + \delta_1 age + \delta_2 age^2 + \rho crowd + \eta \text{Liability Ratio} + v$$

Cores: It is a dummy variable that takes the value of 1 if the person lives with his father, and 0 if not.

Civil status: We define this variable as a dummy that is 1 if the person is married, with a partner, divorced or widowed, and 0 otherwise. It is expected that the probability of coresidence with parents should decrease if the person is in any of these categories.

Urban: We define this variable as a dummy that is 1 if the person lives in an urban area and 0 if not. The probability of coresidence is expected to decrease if the person lives in a city.

Age: As people get older, the rate of coresidence decreases (see appendix), so the probability of coresidence decreases as well.

Crowd: This is a variable that captures the number of children living in the person's household. It is expected that in a household with more children, the probability of coresidency will decrease.

Liability Ratio: This variable divides the number of "liabilities" with the number of "assets" per household. We define "active" persons as those between the ages of 23 and 65. We define "passive" persons as those who are 75 years of age or older.

Following the functional form employed by Solon (1992), the estimates of the income dimension (principal equation) are obtained from the following regression model:

$$y_s = \alpha + \beta y_f + \gamma_1 age + \gamma_2 age^2 + \delta_1 \text{father age} + \delta_2 \text{father } age^2 + \epsilon_s$$

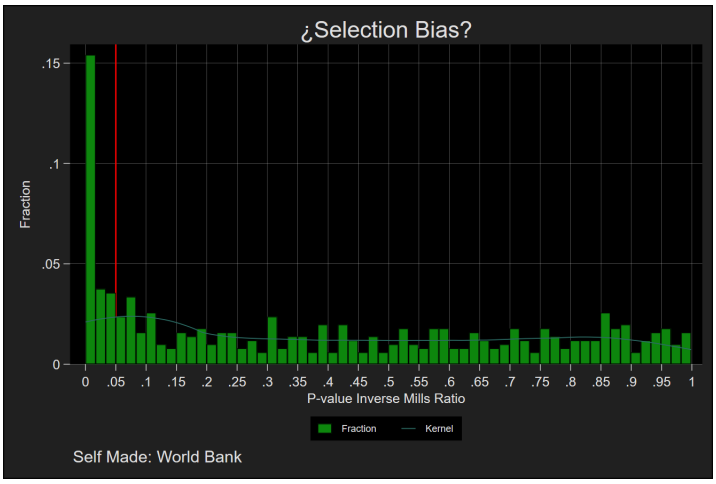
In summary, the following table shows the variables used as controls (main equation) and those used as instruments (participation equation).

Table 5

Variables	**Controls**	**Instruments**
Father's wage	✓	×
Son's age & age^2	✓	✓
Father's age & age^2	✓	×
Civil status	×	✓
Urban	×	✓
Crowd	×	✓
Liability Ratio	×	✓

We conclude the section by showing the distribution that the p-value of the inverse mills ratio has when estimated by heckman.

Figure 3: Inverse Mills Ratio Distribution



We have 506 heckman estimates. 115 (22.7%) of them have a p-value less than 5% in their inverse mills ratio. However, in the results section we can see that the difference between the Heckman and OLS estimates are not very different from each other.

7 Descriptive Statistics

Frequency tables of economies containing the statistic with the fewest estimates are shown below. In other words, if we take another statistic and construct the tables below, we will have more countries in total. Therefore, what is presented below is the lower bound of available countries by dimension and approach.

Table 6: **Education Economies, Cross-Section Approach**

Economies	High income	Low income	Lower middle income	Upper middle income	Total
East Asia & Pacific	3	0	11	3	17
Europe & Central Asia	29	0	3	14	46
Latin America & Caribbean	5	0	5	11	21
Middle East & North Africa	3	2	7	2	14
North America	2	0	0	0	2
South Asia	0	1	6	1	8
Sub-Saharan Africa	0	22	15	5	42
Total	42	25	47	36	150

Self Made: World Bank

Table 7: **Education Economies, Cohort Approach**

Economies	High income	Low income	Lower middle income	Upper middle income	Total
East Asia & Pacific	1	0	10	2	13
Europe & Central Asia	28	0	2	12	42
Latin America & Caribbean	3	0	5	12	20
Middle East & North Africa	1	1	5	2	9
North America	1	0	0	0	1
South Asia	0	1	5	1	7
Sub-Saharan Africa	0	13	10	4	27
Total	34	15	37	33	119

Self Made: World Bank

Table 8: **Income Economies, Cross-Section Approach**

Economies	High income	Low income	Lower middle income	Upper middle income	Total
East Asia & Pacific	3	0	5	2	10
Europe & Central Asia	24	0	3	10	37
Latin America & Caribbean	3	0	4	10	17
Middle East & North Africa	2	1	3	2	8
North America	2	0	0	0	2
South Asia	0	1	5	0	6
Sub-Saharan Africa	0	5	4	1	10
Total	34	7	24	25	90

Self Made: World Bank

It can be seen that for the different dimensions and approaches, we have a number of relevant economies to carry out the study.

Below is a series of tables with different statistics for the combination of coresident children who have the relevant age between 23 and 30, and their parents.

Table 9: **Mean Statistics by Income**

Income	**Coresidence Rate**	**Labor Participation Rate**	**Father Schooling**	**Son Schooling**
High income	.45	.8	11	12
Low income	.3	.77	5.1	7.5
Lower middle income	.46	.83	6.2	9.3
Upper middle income	.5	.84	8.4	11
Total	.46	.82	8.6	11

Self Made: World Bank

Table 10: **Mean Statistics by Region**

Region	Coresidence Rate	Labor Participation Rate	Father Schooling	Son Schooling
East Asia & Pacific	.52	.82	7.8	11
Europe & Central Asia	.51	.8	11	12
Latin America & Caribbean	.37	.87	7.1	10
Middle East & North Africa	.6	.84	7.3	11
North America	.21	.8	13	13
South Asia	.56	.89	5.2	8.5
Sub-Saharan Africa	.32	.76	5.4	8.1
Total	.46	.82	8.5	11

Self Made: World Bank

At all income levels and regions, there has been absolute positive social mobility in the years of schooling between the generation of parents and children. For the purposes of our study, we are interested in having the coresidency rate together with the labor participation rate as high as possible in order to avoid selection bias. It is observed that the economies with the highest rates are upper middle-income economies along with South Asian economies.

8 Results

8.1 Education

Mean Estimations by Income

Table 11: Cross-Section Approach

Income	Beta	Pearson	Spearman
High income	.29	.33	.34
Low income	.48	.46	.45
Lower middle income	.45	.47	.47
Upper middle income	.42	.47	.47
Total	.37	.41	.42

Self Made: World Bank

Table 12: Cohort Approach

Income	Beta	Pearson	Spearman
High income	.35	.4	.38
Low income	.47	.48	.45
Lower middle income	.48	.5	.49
Upper middle income	.44	.47	.45
Total	.43	.46	.44

Self Made: World Bank

In line with the existing literature, it can be seen that rich countries have lower intergenerational persistence (mayor social mobility), in any of its forms of measurement. It can also be seen that most of the time the estimation of Beta (regression coefficient) is the measure with the lowest persistence with respect to the other measures.

Mean Estimations by Region

Table 13: Cross-Section Approach

Region	Beta	Pearson	Spearman
East Asia & Pacific	.4	.37	.43
Europe & Central Asia	.31	.33	.34
Latin America & Caribbean	.45	.53	.53
Middle East & North Africa	.3	.39	.37
North America	.22	.3	.3
South Asia	.46	.47	.5
Sub-Saharan Africa	.43	.45	.44
Total	.37	.41	.42

Self Made: World Bank

Table 14: Cohort Approach

Region	Beta	Pearson	Spearman
East Asia & Pacific	.47	.46	.45
Europe & Central Asia	.37	.39	.37
Latin America & Caribbean	.48	.52	.5
Middle East & North Africa	.35	.39	.37
North America	.25	.39	.4
South Asia	.5	.51	.52
Sub-Saharan Africa	.45	.49	.46
Total	.43	.46	.44

Self Made: World Bank

As before, the regression coefficient remains the statistic with the lowest persistence at the level of regions. The region with the highest intergenerational persistence is South Asia. The cohort approach delivers on average higher levels of intergenerational persistence than the cross section approach.

Mean Estimations over Time

Table 15: Cross-Section Approach

Year	Beta	Pearson	Spearman
2000	.38	.44	.44
2001	.41	.47	.47
2002	.41	.45	.45
2003	.42	.46	.46
2004	.36	.4	.41
2005	.37	.42	.42
2006	.37	.41	.41
2007	.37	.39	.4
2008	.38	.4	.42
2009	.38	.4	.41
2010	.36	.38	.39
2011	.37	.41	.41
2012	.37	.41	.4
2013	.35	.37	.38
2014	.39	.43	.43
2015	.37	.41	.43
2016	.35	.41	.41
2017	.36	.4	.4
2018	.34	.4	.41
2019	.35	.38	.4
2020	.35	.38	.38
Total	.37	.41	.42

Self Made: World Bank

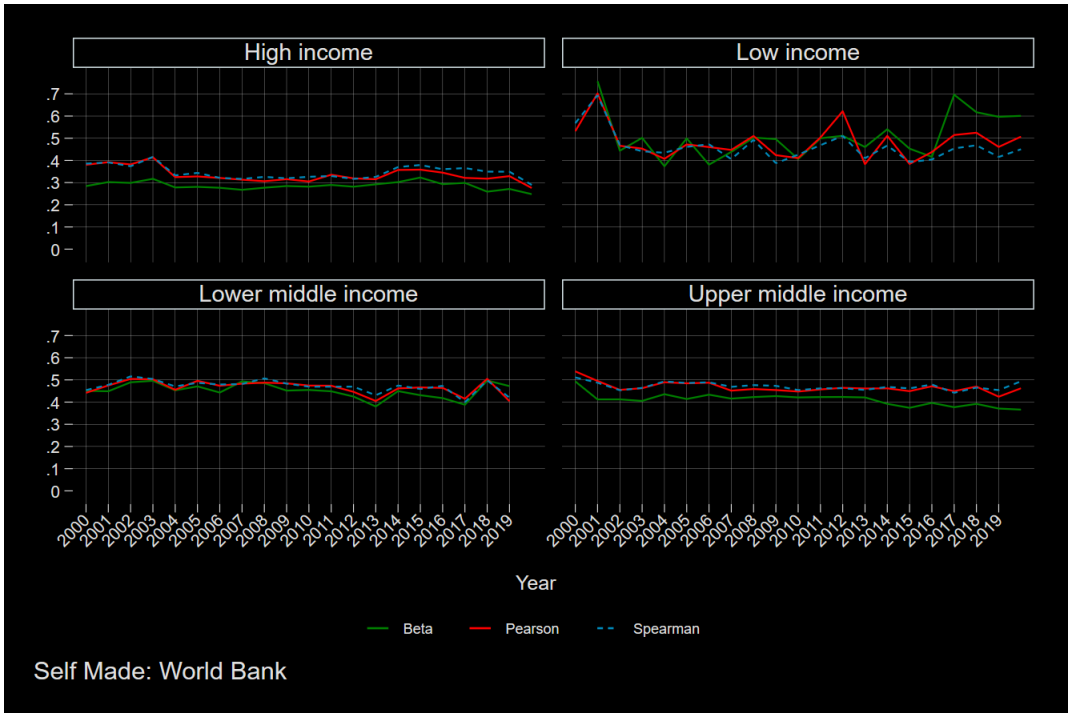
Table 16: Cohort Approach

Cohort	Beta	Pearson	Spearman
1970	.48	.5	.49
1971	.44	.49	.47
1972	.44	.48	.46
1973	.46	.51	.47
1974	.45	.49	.47
1975	.42	.46	.44
1976	.4	.45	.44
1977	.42	.47	.45
1978	.42	.45	.44
1979	.42	.46	.43
1980	.44	.47	.45
1981	.43	.46	.46
1982	.42	.46	.45
1983	.42	.44	.42
1984	.41	.44	.43
1985	.41	.45	.42
1986	.4	.44	.43
1987	.41	.46	.44
1988	.44	.47	.44
1989	.42	.45	.43
Total	.42	.46	.44

Self Made: World Bank

There is a small downward trend in intergenerational persistence over time, independent of the approach.

Figure 4: Education Estimations Evolution, Cross-Section Approach



High-income countries have systematically lower intergenerational persistence than poorer countries. These differences are not as marked between upper-middle and lower-middle income countries. Estimates at all income levels are quite robust most of the time.

Table 17: Educational Intergenerational Persistence

	(1) Correlation	(2) Beta Regression	(3) Spearman
ln(Per Capita PPP)	-0.0446***	-0.0610***	-0.0302***
	(-3.81)	(-7.12)	(-3.36)
ln(Gini)	0.226***	0.151***	0.231***
	(5.89)	(6.16)	(6.83)
ln(Govt Education Expenditure)	-0.0527*	-0.0535***	-0.0722***
	(-2.18)	(-3.34)	(-3.41)
ln(Economy Liberalization)	0.0178	-0.00560	-0.0596*
	(0.48)	(-0.25)	(-2.52)
Constant	0.0110	0.511**	0.212
	(0.04)	(3.27)	(0.92)
R2_ajusted	0.325	0.433	0.507
Akaike	-1025.6	-1075.9	-1218.8
Bayes	-1002.7	-1054.0	-1196.8
Observations	726	595	610

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It is observed that all regressors have the expected sign, with the income, inequality and education expenditure variables being statistically significant. No statistical significance is seen for the globalization variable except for the spearman coefficient. We use the reciprocal of the standard deviation of the dependent variable as the expansion factor for the regressions.

To assess economic significance, we must know how the variables are constructed. The income variable is measured in 2017 dollars adjusted for purchasing power parity. The inequality variable takes the gini coefficient on a scale from 0 to 100. The economic openness variable is constructed on the same scale. Finally, government spending on education is measured in percentage points with respect to the GDP of the economies.

Let us analyze significance using the regression coefficient (beta). If inequality were to increase by 10%, then intergenerational persistence, measured in this way, would increase on average by 1.51 points. Given the same increase in the country's globalization, intergenerational persistence would fall by -0.056 points on average. If the government were to

spend 100% more (double in absolute terms), intergenerational persistence would fall by 5.35 points. For the same increase in GDP per capita, persistence would fall by an average of 6.1 points. In our view, the variables that are economically significant are inequality and education spending, given the magnitude of the average response to the above-mentioned changes.

8.2 Income

Mean Estimations by Income & Region

Table 18: Cross-Section Approach

Income	Regression	Heckman	Elasticity	Pearson	Spearman
High income	.14	.24	.23	.21	.26
Low income	.38	.36	.36	.39	.4
Lower middle income	.38	.34	.36	.45	.44
Upper middle income	.34	.3	.31	.4	.38
Total	.24	.29	.29	.31	.34

Self Made: World Bank

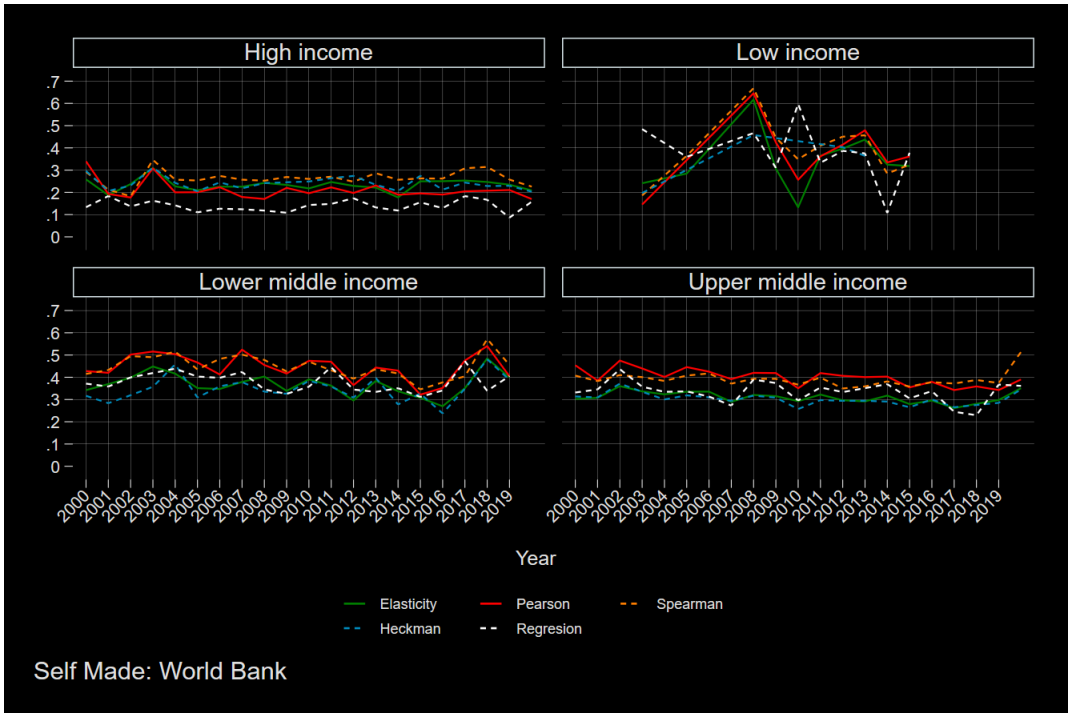
Table 19: Cross-Section Approach

Region	Regression	Heckman	Elasticity	Pearson	Spearman
East Asia & Pacific	.32	.36	.35	.4	.43
Europe & Central Asia	.16	.26	.25	.21	.26
Latin America & Caribbean	.32	.29	.3	.41	.4
Middle East & North Africa	.21	.23	.24	.24	.27
North America	.13	.15	.16	.13	.17
South Asia	.4	.37	.41	.45	.48
Sub-Saharan Africa	.41	.37	.4	.44	.43
Total	.24	.29	.29	.31	.34

Self Made: World Bank

'Regresion' corresponds to elasticity without age controls. It can be seen that for the different countries the lower bound of the estimates come from Heckman, and the upper bound comes from the level (pearson) and rank (spearman) correlations. As in the education dimension, it is observed that high-income countries have lower intergenerational persistence, and that South Asia leads in this aspect by region.

Figure 5: Income Estimations Evolution, Cross-Section Approach



Unlike the education dimension, the estimates in the income dimension are not as robust. Low-income countries have quite large highs and lows, this could be explained by the low number of survey observations we found in this group, leading to low statistical power and more volatile estimates. We do not see an upward or downward trajectory of intergenerational persistence.

Table 20: Income Intergenerational Persistence

	(1) Heckman	(2) Elasticity	(3) Spearman
ln(Per Capita PPP)	-0.0289	-0.0258	-0.0378**
	(-1.58)	(-1.90)	(-3.32)
ln(Gini)	0.0534	0.0691*	0.169***
	(1.42)	(1.97)	(5.28)
ln(Govt Education Expenditure)	-0.0479	-0.0664**	-0.0676**
	(-1.48)	(-2.86)	(-2.79)
ln(Economy Liberalization)	-0.0837*	-0.0992**	-0.115***
	(-2.19)	(-2.93)	(-3.42)
Constant	0.780**	0.782**	0.663**
	(2.76)	(2.92)	(2.87)
R2_ajusted	0.170	0.273	0.407
Akaike	-446.8	-644.2	-646.0
Bayes	-429.4	-625.2	-626.5
Observations	240	328	367

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

All coefficients have the expected sign. As before, we use the reciprocal of the standard deviation of the dependent variable as the expansion factor for the regressions. The statistical significance of the variables is concentrated in the Spearman model. Now the only economically relevant variable in terms of magnitude appears to be government spending on education.

9 Conclusions

In this paper we have studied relative social mobility through intergenerational persistence with the dimensions of income and education. Consistently, it has been found that high-income countries have lower intergenerational persistence, and that the South Asian region is the one with the lowest intergenerational persistence. Relative social mobility at the aggregate level has improved timidly over time. We find evidence that inequality and public spending on education are relevant variables that increase social mobility. This suggests that governments have the possibility of generating public policies that bring us closer to a society with greater equality of opportunities.

These data could be used to make estimates by changing some of the many parameters and filters that we use in this work. The most relevant would be the age bracket of the children, the participation equation in the heckman estimates, and the survey filters in terms of the minimum number of observations per estimator and plausible estimates. These changes can provide us with information on how robust our results are if we adjust these parameters. Additionally, key variables such as returns to education as argued in Solon (2004) could be added to the regression analysis.

10 Bibliography

- Corak, M. (2013). Income Inequality, Equality of Opportunity, and Intergenerational Mobility. Journal of Economic Perspectives, 27(3), 79–102.

- Emran, M. Shahe; Greene, William; Shilpi, Forhad. 2016. When Measure Matters: Coresidency, Truncation Bias, and Intergenerational Mobility in Developing Countries. Policy Research Working Paper; No. 7608. © World Bank, Washington, DC

- Emran, M. Shahe; Shilpi, Forhad. 2018. Estimating Intergenerational Mobility with Incomplete Data: Coresidency and Truncation Bias in Rank-Based Relative and Absolute Mobility Measures. Policy Research Working Paper; No. 8414. © World Bank, Washington, DC

- Nuñez J & Risco C "Movilidad intergeneracional del ingreso en un país en desarrollo. El caso de Chile", Departamento de Economía Uchile, 2004

- Nuñez, J & Sanhueza, J (2015) - The expansion of education and the evolution of Intergenerational Mobility, Departamento de Economía, Universidad de Chile

- Mayer, S & Lopoo, L. (2008). Government spending and intergenerational mobility. Journal of Public Economics, 92(1-2), 139–158

- Morales, C. (2014). "¿Movilidad Intergeneracional de Ingresos: Una perspectiva de Largo Plazo?". Undergraduate thesis. Universidad de Chile

Raj Chetty, Nathaniel Hendren, Patrick Kline, Emmanuel Saez, Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States , The Quarterly Journal of Economics, Volume 129, Issue 4, November 2014, Pages 1553–1623

- Sanhueza, J. (2001). "Mecanismos de transmisión de la movilidad intergeneracional:

Chile Cohortes 1962-1984". Postgraduate thesis. Universidad de Chile

- Solon, G. (1992). "Intergenerational Income Mobility in the United States", The American Economic Review. Vol.82, n°3, pp.393-408

- Solon, G. (2004). A model of intergenerational mobility variation over time and place. Generational Income Mobility in North America and Europe, 38–47

- Torche, F. 2013. How do we characteristically measure and analyze intergenerational mobility?. The Stanford Center on Poverty and Inequality. New York University

- Teorell, Jan, Aksel Sundström, Sören Holmberg, Bo Rothstein, Natalia Alvarado Pachon, Cem Mert Dalli Yente Meijers. 2023. The Quality of Government Standard Dataset, version Jan23. University of Gothenburg: The Quality of Government Institute

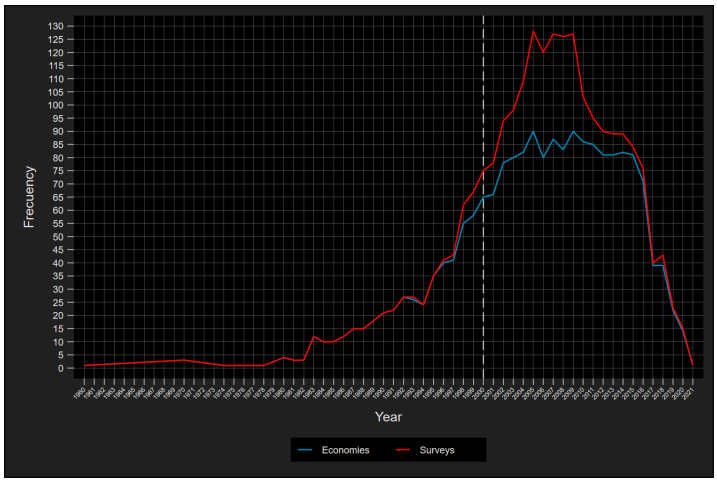
- Van der Weide, Roy; Narayan, Ambar; Cojocaru, Alexandru; Lakner, Christoph; Redaelli, Silvia; Mahler, Daniel Gerszon; Ramasubbaiah, Rakesh Gupta N.; Thewissen, Stefan. 2018. Fair Progress?: Economic Mobility Across Generations Around the World. Equity and Development. © Washington, DC: World Bank

-Van der Weide, Roy; Lakner, Christoph; Mahler, Daniel Gerszon; Narayan, Ambar; Ramasubbaiah, Rakesh. 2021. Intergenerational Mobility around the World. Policy Research Working Paper;No. 9707. © World Bank, Washington, DC

- Xie, G. E., Zhang, X. M. (2022). The Effect of Trade Liberalization on Intergenerational Income Mobility. Open Journal of Business and Management, 10, 1784-1810.

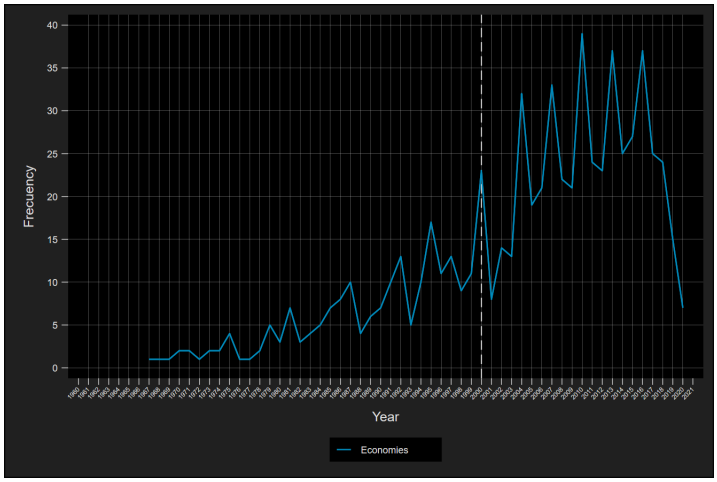
11 Appendix

Figure 6: I2D2 Economy-Survey Distribution, Cross-Section Approach



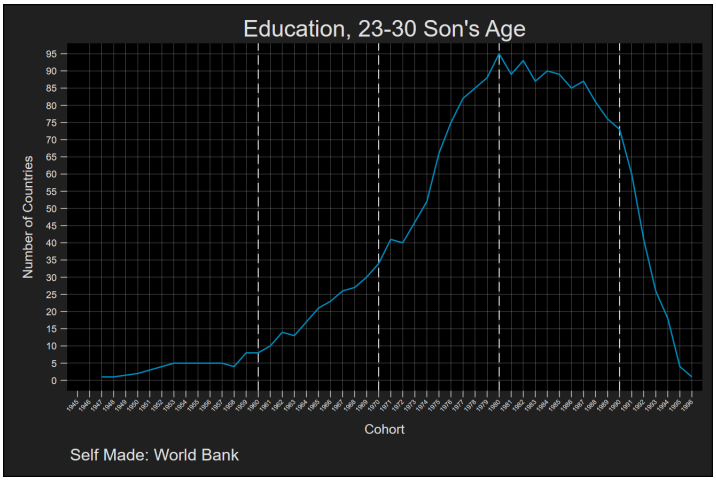
For a particular year there may be more surveys than countries given that a country in that year may have had more than one annual survey.

Figure 7: LIS Economy-Survey Distribution



Unlike the I2D2 source, the number of surveys matches the number of economies every year. This means that all countries in a particular year have only one survey.

Figure 8: I2D2 Economy-Survey Distribution, Cohort Approach

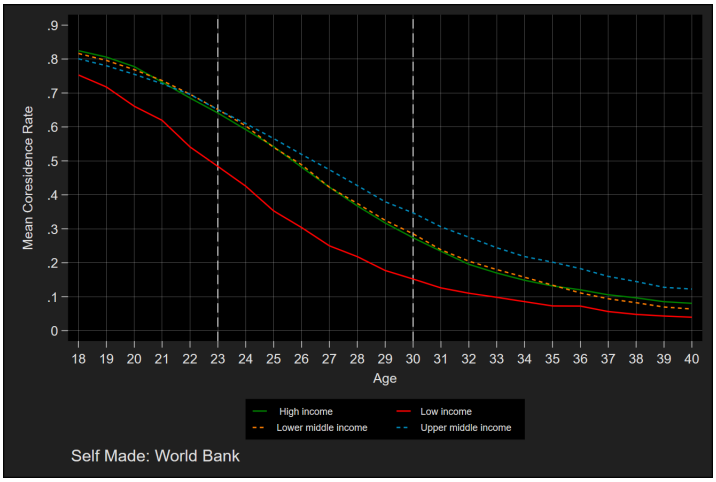


The distribution of available countries by cohort in the education estimates is shown here. We chose the cohorts between 1970-1989 as this is the range with the highest coverage.

11.1 Concepts

$$\text{Coresidence Rate} = \frac{\text{Son's living with their father}}{\text{Total of Son's}}$$

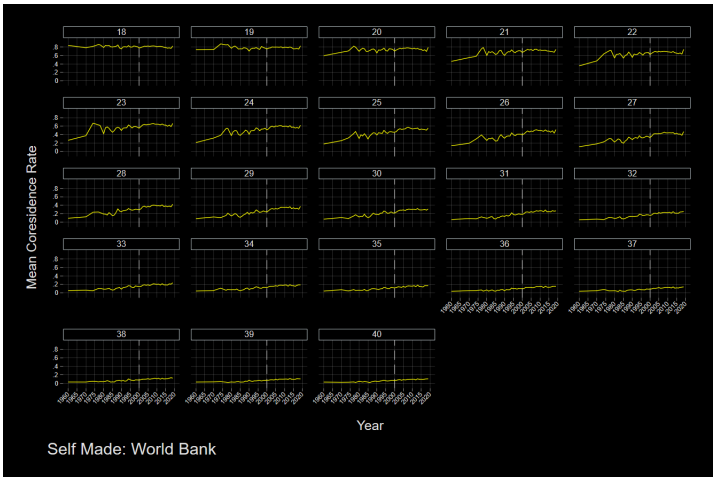
Figure 9: Coresidence Rate Over Life Cycle



In the ideal world we would have 100% of the people living with their parents, so as to

observe all father-son combinations, obtaining a representative sample. The higher the coresidence rate, the lower the "coresidence bias".

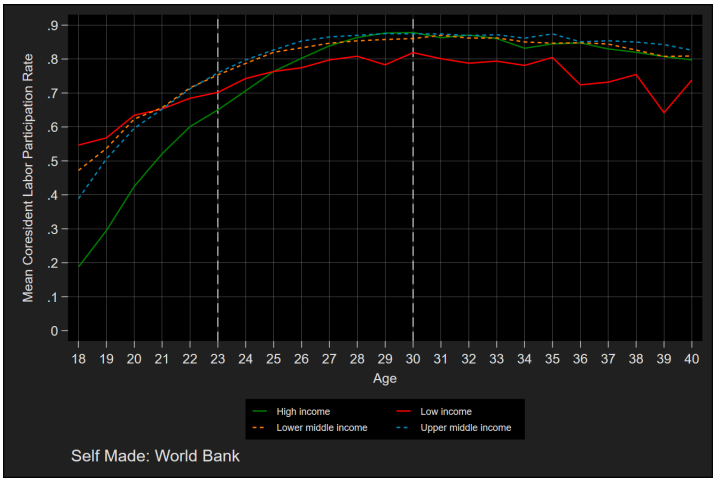
Figure 10: Coresidence Rate Over Time



The average coresidency rate in the relevant age bracket has increased over the years.

$$\boxed{\text{Labor Participation Rate} = \frac{\text{Employed+Unemployed}}{\text{Working age population}}}$$

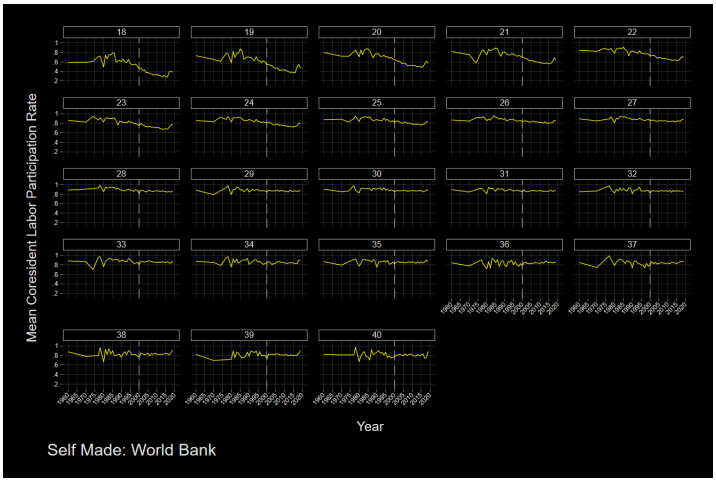
Figure 11: Labor Participation Rate Over Life Cycle



In the ideal world we would have that the labor participation rate is 100%, so that there

are no parent-child combinations without income observations, obtaining a representative sample. The labor participation rate is seen to grow naturally as one moves through the life cycle.

Figure 12: Labor Participation Rate Over Time



The average labor participation rate has fallen over time in the relavant age bracket, presumably due to the increased opportunities that have opened up in tertiary education.

Figure 13: Survey Estimations Filter

Each point on the graph corresponds to a survey. The horizontal axis corresponds to the logarithm of the observations from the income regressions. Being the income dimension, the cutoff in this case is at ln(100). The vertical axis corresponds to the distance (in absolute value) between the survey estimate and the median of the estimates by economy. The critical point corresponds to 0.2 points of difference. The graph has 871 surveys, of which 77% have more than 100 observations, 92% have a median error of less than 0.2, and 74% meet both criteria at the same time. In practice by estimator, we keep all those surveys that are in the lower right quadrant.

Figure 14: Inequality and Intergenerational Persistence Relation

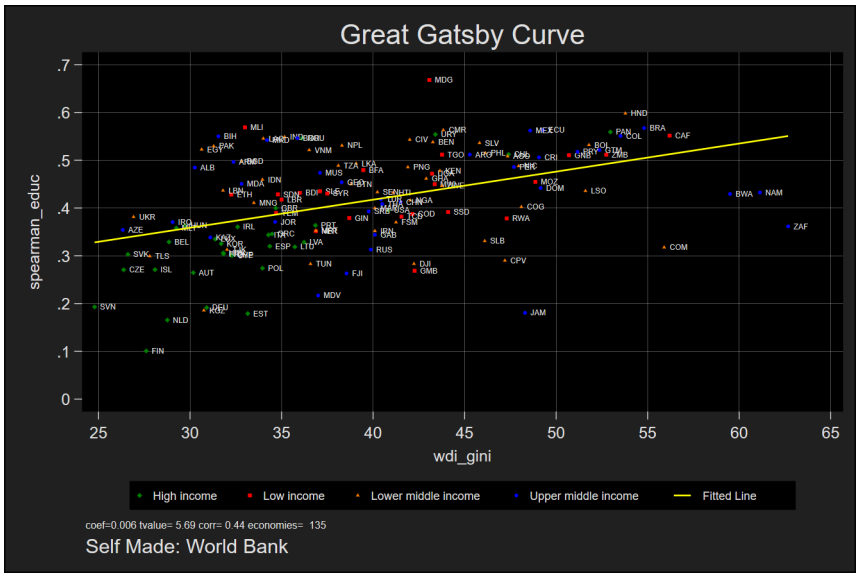
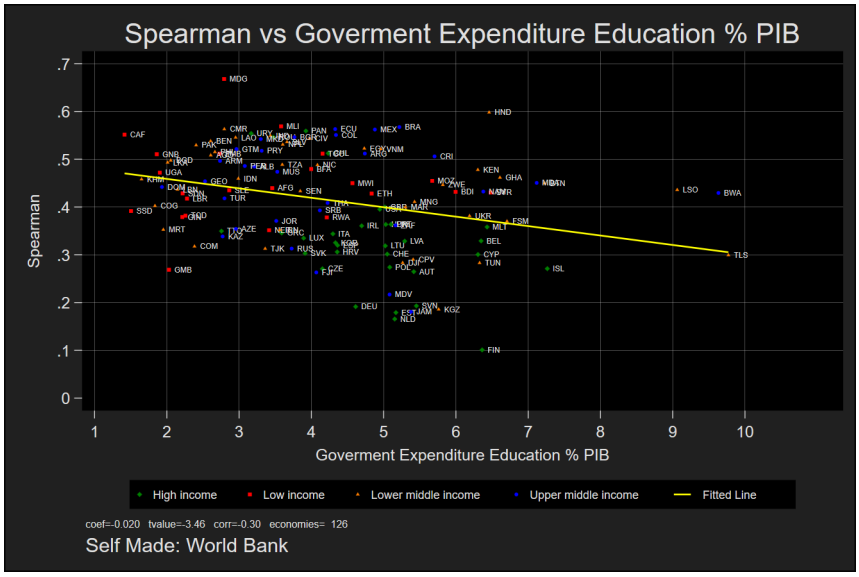


Figure 15: Goverment Education Expenditure and Intergenerational Persistence Relation



11.2 Mathematical

$$\text{Spearman Correlation} = 1 - \frac{6\sum[R(x_i) - R(y_i)]}{n(n^2-1)}$$

$$\text{Regression Coefficient } (\beta) = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{\sum_{i=1}^{n}(x_i - \overline{x})^2}$$

$$\text{Pearson Correlation } (\rho) = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \overline{x})^2} \cdot \sqrt{\sum_{i=1}^{n}(y_i - \overline{y})^2}}$$

After dividing by the number of observations in the numerator and denominator in both parameters β and ρ, we get that:

$$\beta = \frac{Cov(X,Y)}{Var(X)} = \frac{\sigma_{x,y}}{\sigma_x^2}$$

$$\rho = \frac{Cov(X,Y)}{Sd(X) \cdot Sd(Y)} = \frac{\sigma_{x,y}}{\sigma_x \cdot \sigma_y}$$

$$\boxed{\therefore \beta = \rho\frac{\sigma_y}{\sigma_x}}$$

11.3 Economy Categories

Table 21: High Income Economies

Economy	Code	Region
Aruba	ABW	Latin America & Caribbean
Andorra	AND	Europe & Central Asia
United Arab Emirates	ARE	Middle East & North Africa
Antigua and Barbuda	ATG	Latin America & Caribbean
Australia	AUS	East Asia & Pacific
Austria	AUT	Europe & Central Asia
Belgium	BEL	Europe & Central Asia
Bahrain	BHR	Middle East & North Africa
Bahamas, The	BHS	Latin America & Caribbean
Bermuda	BMU	North America
Barbados	BRB	Latin America & Caribbean
Brunei Darussalam	BRN	East Asia & Pacific
Canada	CAN	North America
Switzerland	CHE	Europe & Central Asia
Channel Islands	CHI	Europe & Central Asia
Chile	CHL	Latin America & Caribbean
Curaçao	CUW	Latin America & Caribbean
Cayman Islands	CYM	Latin America & Caribbean
Cyprus	CYP	Europe & Central Asia
Czech Republic	CZE	Europe & Central Asia
Germany	DEU	Europe & Central Asia
Denmark	DNK	Europe & Central Asia
Spain	ESP	Europe & Central Asia
Estonia	EST	Europe & Central Asia
Finland	FIN	Europe & Central Asia
France	FRA	Europe & Central Asia
Faroe Islands	FRO	Europe & Central Asia
United Kingdom	GBR	Europe & Central Asia
Gibraltar	GIB	Europe & Central Asia
Greece	GRC	Europe & Central Asia
Greenland	GRL	Europe & Central Asia
Guam	GUM	East Asia & Pacific
Hong Kong SAR, China	HKG	East Asia & Pacific
Croatia	HRV	Europe & Central Asia
Hungary	HUN	Europe & Central Asia
Isle of Man	IMN	Europe & Central Asia
Ireland	IRL	Europe & Central Asia
Iceland	ISL	Europe & Central Asia
Israel	ISR	Middle East & North Africa
Italy	ITA	Europe & Central Asia
Japan	JPN	East Asia & Pacific
St. Kitts and Nevis	KNA	Latin America & Caribbean
Korea, Rep.	KOR	East Asia & Pacific
Kuwait	KWT	Middle East & North Africa
Liechtenstein	LIE	Europe & Central Asia
Lithuania	LTU	Europe & Central Asia
Luxembourg	LUX	Europe & Central Asia
Latvia	LVA	Europe & Central Asia
Macao SAR, China	MAC	East Asia & Pacific
St. Martin (French part)	MAF	Latin America & Caribbean
Monaco	MCO	Europe & Central Asia
Malta	MLT	Middle East & North Africa
Northern Mariana Islands	MNP	East Asia & Pacific
New Caledonia	NCL	East Asia & Pacific
Netherlands	NLD	Europe & Central Asia
Norway	NOR	Europe & Central Asia
Nauru	NRU	East Asia & Pacific
New Zealand	NZL	East Asia & Pacific
Oman	OMN	Middle East & North Africa
Panama	PAN	Latin America & Caribbean
Poland	POL	Europe & Central Asia
Puerto Rico	PRI	Latin America & Caribbean
Portugal	PRT	Europe & Central Asia
French Polynesia	PYF	East Asia & Pacific
Qatar	QAT	Middle East & North Africa
Romania	ROU	Europe & Central Asia
Saudi Arabia	SAU	Middle East & North Africa
Singapore	SGP	East Asia & Pacific
San Marino	SMR	Europe & Central Asia
Slovak Republic	SVK	Europe & Central Asia
Slovenia	SVN	Europe & Central Asia
Sweden	SWE	Europe & Central Asia
Sint Maarten (Dutch part)	SXM	Latin America & Caribbean
Seychelles	SYC	Sub-Saharan Africa
Turks and Caicos Islands	TCA	Latin America & Caribbean
Trinidad and Tobago	TTO	Latin America & Caribbean
Taiwan, China	TWN	East Asia & Pacific
Uruguay	URY	Latin America & Caribbean
United States	USA	North America
British Virgin Islands	VGB	Latin America & Caribbean
Virgin Islands (U.S.)	VIR	Latin America & Caribbean

Table 22: Upper Middle Income Economies

Economy	Code	Region
Albania	ALB	Europe & Central Asia
Argentina	ARG	Latin America & Caribbean
Armenia	ARM	Europe & Central Asia
American Samoa	ASM	East Asia & Pacific
Azerbaijan	AZE	Europe & Central Asia
Bulgaria	BGR	Europe & Central Asia
Bosnia and Herzegovina	BIH	Europe & Central Asia
Belarus	BLR	Europe & Central Asia
Belize	BLZ	Latin America & Caribbean
Brazil	BRA	Latin America & Caribbean
Botswana	BWA	Sub-Saharan Africa
China	CHN	East Asia & Pacific
Colombia	COL	Latin America & Caribbean
Costa Rica	CRI	Latin America & Caribbean
Cuba	CUB	Latin America & Caribbean
Dominica	DMA	Latin America & Caribbean
Dominican Republic	DOM	Latin America & Caribbean
Ecuador	ECU	Latin America & Caribbean
Fiji	FJI	East Asia & Pacific
Gabon	GAB	Sub-Saharan Africa
Georgia	GEO	Europe & Central Asia
Equatorial Guinea	GNQ	Sub-Saharan Africa
Grenada	GRD	Latin America & Caribbean
Guatemala	GTM	Latin America & Caribbean
Guyana	GUY	Latin America & Caribbean
Iraq	IRQ	Middle East & North Africa
Jamaica	JAM	Latin America & Caribbean
Jordan	JOR	Middle East & North Africa
Kazakhstan	KAZ	Europe & Central Asia
Libya	LBY	Middle East & North Africa
St. Lucia	LCA	Latin America & Caribbean
Moldova	MDA	Europe & Central Asia
Maldives	MDV	South Asia
Mexico	MEX	Latin America & Caribbean
Marshall Islands	MHL	East Asia & Pacific
North Macedonia	MKD	Europe & Central Asia
Montenegro	MNE	Europe & Central Asia
Mauritius	MUS	Sub-Saharan Africa
Malaysia	MYS	East Asia & Pacific
Namibia	NAM	Sub-Saharan Africa
Peru	PER	Latin America & Caribbean
Palau	PLW	East Asia & Pacific
Paraguay	PRY	Latin America & Caribbean
Russian Federation	RUS	Europe & Central Asia
Serbia	SRB	Europe & Central Asia
Suriname	SUR	Latin America & Caribbean
Thailand	THA	East Asia & Pacific
Turkmenistan	TKM	Europe & Central Asia
Tonga	TON	East Asia & Pacific
Türkiye	TUR	Europe & Central Asia
Tuvalu	TUV	East Asia & Pacific
St. Vincent and the Grenadines	VCT	Latin America & Caribbean
Kosovo	XKX	Europe & Central Asia
South Africa	ZAF	Sub-Saharan Africa

Table 23: Lower Middle Income Economies

Economy	Code	Region
Angola	AGO	Sub-Saharan Africa
Benin	BEN	Sub-Saharan Africa
Bangladesh	BGD	South Asia
Bolivia	BOL	Latin America & Caribbean
Bhutan	BTN	South Asia
Côte d'Ivoire	CIV	Sub-Saharan Africa
Cameroon	CMR	Sub-Saharan Africa
Congo, Rep.	COG	Sub-Saharan Africa
Comoros	COM	Sub-Saharan Africa
Cabo Verde	CPV	Sub-Saharan Africa
Djibouti	DJI	Middle East & North Africa
Algeria	DZA	Middle East & North Africa
Egypt, Arab Rep.	EGY	Middle East & North Africa
Micronesia, Fed. Sts.	FSM	East Asia & Pacific
Ghana	GHA	Sub-Saharan Africa
Honduras	HND	Latin America & Caribbean
Haiti	HTI	Latin America & Caribbean
Indonesia	IDN	East Asia & Pacific
India	IND	South Asia
Iran, Islamic Rep.	IRN	Middle East & North Africa
Kenya	KEN	Sub-Saharan Africa
Kyrgyz Republic	KGZ	Europe & Central Asia
Cambodia	KHM	East Asia & Pacific
Kiribati	KIR	East Asia & Pacific
Lao PDR	LAO	East Asia & Pacific
Lebanon	LBN	Middle East & North Africa
Sri Lanka	LKA	South Asia
Lesotho	LSO	Sub-Saharan Africa
Morocco	MAR	Middle East & North Africa
Myanmar	MMR	East Asia & Pacific
Mongolia	MNG	East Asia & Pacific
Mauritania	MRT	Sub-Saharan Africa
Nigeria	NGA	Sub-Saharan Africa
Nicaragua	NIC	Latin America & Caribbean
Nepal	NPL	South Asia
Pakistan	PAK	South Asia
Philippines	PHL	East Asia & Pacific
Papua New Guinea	PNG	East Asia & Pacific
West Bank and Gaza	PSE	Middle East & North Africa
Senegal	SEN	Sub-Saharan Africa
Solomon Islands	SLB	East Asia & Pacific
El Salvador	SLV	Latin America & Caribbean
São Tomé and Príncipe	STP	Sub-Saharan Africa
Eswatini	SWZ	Sub-Saharan Africa
Tajikistan	TJK	Europe & Central Asia
Timor-Leste	TLS	East Asia & Pacific
Tunisia	TUN	Middle East & North Africa
Tanzania	TZA	Sub-Saharan Africa
Ukraine	UKR	Europe & Central Asia
Uzbekistan	UZB	Europe & Central Asia
Vietnam	VNM	East Asia & Pacific
Vanuatu	VUT	East Asia & Pacific
Samoa	WSM	East Asia & Pacific
Zimbabwe	ZWE	Sub-Saharan Africa

Table 24: Low Income Economies

Economy	Code	Region
Afghanistan	AFG	South Asia
Burundi	BDI	Sub-Saharan Africa
Burkina Faso	BFA	Sub-Saharan Africa
Central African Republic	CAF	Sub-Saharan Africa
Congo, Dem. Rep.	COD	Sub-Saharan Africa
Eritrea	ERI	Sub-Saharan Africa
Ethiopia	ETH	Sub-Saharan Africa
Guinea	GIN	Sub-Saharan Africa
Gambia, The	GMB	Sub-Saharan Africa
Guinea-Bissau	GNB	Sub-Saharan Africa
Liberia	LBR	Sub-Saharan Africa
Madagascar	MDG	Sub-Saharan Africa
Mali	MLI	Sub-Saharan Africa
Mozambique	MOZ	Sub-Saharan Africa
Malawi	MWI	Sub-Saharan Africa
Niger	NER	Sub-Saharan Africa
Korea, Dem. People's Rep.	PRK	East Asia & Pacific
Rwanda	RWA	Sub-Saharan Africa
Sudan	SDN	Sub-Saharan Africa
Sierra Leone	SLE	Sub-Saharan Africa
Somalia	SOM	Sub-Saharan Africa
South Sudan	SSD	Sub-Saharan Africa
Syrian Arab Republic	SYR	Middle East & North Africa
Chad	TCD	Sub-Saharan Africa
Togo	TGO	Sub-Saharan Africa
Uganda	UGA	Sub-Saharan Africa
Yemen, Rep.	YEM	Middle East & North Africa
Zambia	ZMB	Sub-Saharan Africa