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Social mobility in Latin America

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Social Mobility in Latin America

por
Lykke E. Andersen

Social Mobility in Latin America[1]

by

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November 13, 2000

Abstract:

This paper proposes a new measure of social mobility. It is based on schooling gap regressions, and uses the Fields decomposition to determine the importance of family background in explaining teenagers' schooling gaps.

The method is applied to a sample of 18 Latin American household surveys conducted in the late 1990s. We find Chile, Argentina, Uruguay, and Peru among the countries with highest social mobility, and Guatemala and Brazil among the least socially mobile countries. The results show that social mobility is positively correlated with GDP and general educational attainment, but not related to income inequality in any obvious way. Social mobility is generally higher in highly urbanized countries.

The schooling gap regressions also reveal differences in opportunities within the family. Resources are clearly being diverted away from older siblings (especially sisters) towards younger siblings. In addition, it is an advantage to be born into the household relatively late in the lifecycle of the parents. For most countries, female teenagers were found to have significantly smaller schooling gaps than male teenagers. This did not make them significantly more mobile, however.

[1] This paper was prepared for the 8th round of the Inter-American Development Bank Research Network Project on Adolescents and Young Adults: Critical Decisions at a Critical Age. Financial assistance from the Bank is greatly appreciated. The findings, interpretations, and conclusions expressed are entirely those of the author, however, and do not necessarily represent the views of the Inter-American Development Bank. I would like to thank Ricardo Fuentes for extensive help with non-standard data for this project, and Eduardo Antelo, Alice Brooks, Alejandra Cox Edwards, Suzanne Duryea, Alejandro Gaviria, Marianne Hilgert, Osvaldo Nina, Manuelita Ureta, Miguel Urquiola, Diana Weinhold, and Ernesto Yáñez for their valuable comments and suggestions. I also thank the Catholic University in La Paz for the release time and resources they provided for this study.

1. Introduction

Latin American countries are generally known to have very unequal income distributions compared to most other countries in the world. This is considered undesirable because it implies that a lot of people live in poverty.

However, high inequality combined with high social mobility is not as bad as high inequality combined with low social mobility. Actually, the high inequality – high mobility combination appears to be beneficial for long run growth prospects. It provides people with very good incentives to work hard, be innovative, and take risks, because the expected returns are high. The high inequality – low mobility combination, on the other hand, does not provide such incentives. Rich people have little incentive to work hard, because they are born rich and they will remain rich no matter what they do. Poor people also have little incentive to work hard, because no matter what they do they are unlikely to move up the economic ladder.

The purpose of this paper is to investigate the degree of social mobility in Latin American countries. For that purpose we propose a new measure of social mobility, which has the strong advantage that it can be calculated from standard household survey data, which is available for most countries. It basically measures how important family background is in determining the education of teenagers. If family background is very important, we will say that social mobility is low.

Social mobility in this sense is likely to be correlated with income mobility, given the close connection between education and income. A measure based on education, however, is more desirable than a measure based on income, because there are many more problems associated with the reporting of income than the reporting of education[2].

The remainder of the paper is organized as follows. Section 2 describes the methodology used to estimate social mobility. Section 3 describes the data used for the project. Section 4 summarizes the main results and compares them with previous estimates of social mobility in Latin America. Section 5 discusses the results both at cross-country level and at household level. Section 6 provides conclusions and policy implications.

2. Methodology

The main idea behind our proposed methodology is the following: If family background (parents' education and household income) is important in determining a child's opportunities, then social mobility is low. On the other hand, if family background is not important in explaining opportunities, then social mobility is high.

As an indicator of opportunities we use the schooling gap, which is defined as the disparity between the years of education that a teenager or young adult would have completed had she entered school at normal school starting age[3] and advanced one grade each year, on one hand, and the actual years of education, on the other hand. Thus, the schooling gap measures years of missing education.

For example, an 18-year old teenager who has completed 9 years of schooling, will register a schooling gap of (18-9-6) = 3 years, if he lives in a country where children are

[2] Székely and Hilgert (1999) have written a very interesting paper on all the problems that arise when trying to compare income measures and GINI coefficients from different Latin American countries.

[3] Normal school starting age is 6 for most countries, but 7 for Brazil, El Salvador, Guatemala, Honduras, and Nicaragua.

supposed to start school at age 6. If he has actually gone to school all the time between age six and 18 (12 years), but has been retained 3 times and required to redo a year, then he will still register as having a schooling gap of 3 years, because years of education is calculated on the basis of the level of schooling reached not on the actual years of studying.

The schooling gap is a very simple indicator of future opportunities, but it is well suited for our purpose and it has several advantages compared to a measure based on earnings or a measure based on years of education. First, income measures are notoriously inaccurate, highly dependent on season for large groups of the population, and generally difficult to compare across countries.[4] Second, years of education is not a good measure of educational attainment for young people, because many of them are still in school. For example, a 14 year old teenager with 8 years of schooling is doing fine, while an 18 year old teenager with 8 years of schooling is a drop-out. The schooling gap measure solves these problems, because years of missing education is a relatively simple measure that is easily comparable across countries and population groups, it is rarely misreported, and it can be used for teenagers that are still of school age. It does not take into account differences in school quality, however, and that seems to be the main drawback. School quality issues will be discussed in section 5 and 6.

We will determine the importance of family background in the following way. For each country we select all the teenagers who live at home (with at least one parent) and regress their schooling gaps on two family background variables (adult household income per capita, and the maximum of father's and mother's education) and a bunch of other variables that might be relevant in explaining schooling gaps (age, age of head parent at birth of the child, dummies for the presence of older sisters, older brothers, younger sisters, or younger brothers, a dummy for a non-biological relation to the household head, a dummy for female-headed households, a dummy for single parent households, a self-employment dummy for the family head, average regional income, and average regional education). We then use the Fields decomposition (Fields 1996) on the regression results to calculate the percentage of the total variance in schooling gaps that can be explained by the two family background variables.

A theoretical derivation of the Fields decomposition is given in Appendix A. In practice it works like this: For each explanatory variable, we calculate a factor inequality weight, which is the product of the coefficient estimate for each explanatory variable, the standard deviation of that same variable, and the correlation between the same variable and the dependent variable. All factor inequality weights in the regression are scaled to sum to R^2, and each is intended to measure what percentage of the total variation is explained by the respective variable. Our Social Mobility Index is 1 minus the sum of the two factor inequality weights belonging to the two family background variables. When our index is low, family background is an important determinant of the education gap, and consequently, social mobility is low.

The two basic assumptions underlying this methodology are that a smaller schooling gap should imply better future opportunities for young people and that equality of opportunity is a good indicator of social mobility. These appear to be reasonable assumptions, given previous vast empirical evidence on the positive links between

[4] See Székely & Hilgert (1999) for an excellent discussion of the differences in income measures in Latin American household surveys.

education and earnings, between educational inequality and income inequality (e.g. Lam 1999), between educational gaps and inequality (e.g. Dahan & Gaviria 2000) and between educational gaps and social mobility (e.g. Dahan & Gaviria 2000).

While the schooling gap regressions are mainly used as intermediate inputs in the calculation of a Social Mobility Index, they contain other important information about the differences in opportunities between young people from different types of households and even between young people within the same household. For example, a child's position in the family might affect his educational attainment and thereby his future opportunities. First-born children, for example, usually enter the family early in the life-cycle of the parents, and as a result, there may not be as many resources available for them as for siblings born later in the life-cycle of the parents (Binder & Woodruff 1999). This argument suggests that younger siblings should have a smaller educational gap than older siblings, and that children with young parents should have a larger schooling gap than children with older parents. There is also likely to be gender differences between educational attainment of siblings, and possibly cross-effects between gender and birth order. An older sister may, for example, receive less education than an older brother because the opportunity costs of her education is larger, while younger siblings may benefit from having older siblings that work and contribute to total household income (see e.g. Jensen 1999). For these reasons we include other variables describing the teenager's position in the family and we discuss the results in detail in Section 5.

Due to clustering at the regional level, we use cluster correction (the Huber/White/ sandwich estimator) in all of our estimations (see Moulton 1986).

3. Data

The main data used for this project is a collection of 18 standardized household surveys from the Inter-American Development Bank. These are briefly described in Table 1.

Table 1: Summary information about household surveys used in the paper

Country	Year	Sample size	Coverage	Name of survey
Argentina	1996	111235	Urban	Encuesta Permanente de Hogares
Bolivia	1997	36752	National	Encuesta Nacional de Empleo
Brazil	1997	346106	National	Pesquisa Nacional por Amostra de Domicilios
Chile	1998	188360	National	Encuesta de Caracterizacion Socioeconomica Nacional
Colombia	1997	143398	National	Encuesta Nacional de Hogares-Fuerza de Trabajo
Costa Rica	1998	43944	National	Encuesta de Hogares de Propositos Multiples
Dominican Rep.	1996	24041	National	Encuesta Nacional de Fuerza de Trabajo
Ecuador	1998	26134	National	Encuesta de Condiciones de Vida
El Salvador	1995	40004	National	Encuesta de Hogares de Propositos Multiples
Guatemala	1998	35725	National	Encuesta Nacional de Ingresos y Gastos Familiares
Honduras	1998	32696	National	Encuesta Permanente de Hogares de Propositos Multiples
Mexico	1996	64916	National	Encuesta Nacional de Ingreso Gasto de los Hogares
Nicaragua	1998	23637	National	Enc. Nac. de Hogares sobre Medicion de Niveles de Vida
Panama	1997	40320	National	Encuesta de Hogares
Paraguay	1998	21910	National	Encuesta de Hogares
Peru	1997	19745	National	Enc. Nac. de Hogares sobre Medicion de Niveles de Vida
Uruguay	1997	64028	Urban	Encuesta Continua de Hogares
Venezuela	1997	76965	National	Encuesta de Hogares por Muestreo

Source: The Inter-American Development Bank, Research Department

The surveys vary hugely in sample size, the largest one being the Brazilian survey containing 346,106 observations and the smallest being the one from Peru with only 19,745 observations. The precision with which we can estimate our Social Mobility Indices will therefore vary considerably across countries, and it is important to calculate confidence intervals for our SMI estimates in order to make sensible comparisons.

The surveys are representative at the national level, except in two cases. The surveys for Argentina and Uruguay cover only urban areas, but since these are highly urbanized countries, the surveys cover most of their populations (80 - 90%).

The most important variable we use in our analysis is years of education, which should be reasonably reliable and comparable across countries. Table 2 provides a summary of schooling gaps for all the teenagers (aged 13-19) and all the young adults (aged 20-25), who are included in our analysis, i.e. still living at home. The normal school start age, which is used to calculate schooling gaps, is also given in this table.

The table shows that about 95% of all teenagers can be included in our analysis, with the remaining 5% being excluded because they don't live at home any more (i.e. they have formed their own households or they live as live-in maids in another household) or because we are missing some crucial information for them (e.g. parents' education levels or household income). The share of teenagers included is relatively stable, varying from 91% in Nicaragua to 98% in Peru.

Table 2: Summary information about schooling gaps for teenagers and adolescents included in the analysis

Country	**Year**	**Normal school starting age**	**Average schooling gap for teenagers**	**Average schooling gap for young adults**	**% of teenagers included in analysis**	**% of young adults included in analysis**
Argentina*	1996	6	0.75	5.39	95%	53%
Bolivia	1997	6	2.33	6.52	94%	47%
Brazil	1997	7	3.27	8.24	94%	49%
Chile	1998	6	1.66	5.89	94%	57%
Colombia	1997	6	2.88	7.81	94%	55%
Costa Rica	1998	6	3.00	8.17	94%	48%
Dominican Republic	1996	6	2.38	7.22	95%	58%
Ecuador	1998	6	2.25	6.79	95%	53%
El Salvador	1995	7	2.71	7.46	94%	51%
Guatemala	1998	7	2.81	7.37	94%	53%
Honduras	1998	7	3.82	9.10	94%	51%
Mexico	1996	6	2.38	8.19	98%	68%
Nicaragua	1998	7	3.75	9.62	91%	47%
Panama	1997	6	2.03	6.48	93%	55%
Paraguay	1998	6	2.80	8.36	94%	49%
Peru	1997	6	1.92	5.83	98%	61%
Uruguay*	1997	6	1.39	6.20	97%	62%
Venezuela	1997	6	2.29	7.67	96%	62%
Average			2.47	7.35	95%	54%

Source: The Inter-American Development Bank, Research Department. Note: * The samples for Argentina and Uruguay cover only urban areas.

In the case of young adults (20 – 25 year olds) we would only able to include an average of 54% of all observations in a social mobility analysis, since almost half of this age group has left home. There is thus a very large group of young adults that are excluded from analysis. Since young adults who leave home relatively early may be significantly different in terms of social mobility from those who leave home later, we

suspect that a social mobility measure based on young adults may be biased. Furthermore, the share of young adults that can be included in the analysis varies greatly across countries, from 47% in Nicaragua to 68% in Mexico.

The variable that is most prone to measurement error and least comparable across countries is "total adult household income". For some countries that includes only labor income, while for other countries it also includes non-labor income, capital rents, property rents, and non-monetary income. In some cases missing observations have been imputed by the national statistical offices, in other cases they have been imputed by the research department at the Inter-American Development Bank. Only in the latter case were we able to include a dummy, when values were imputed[5].

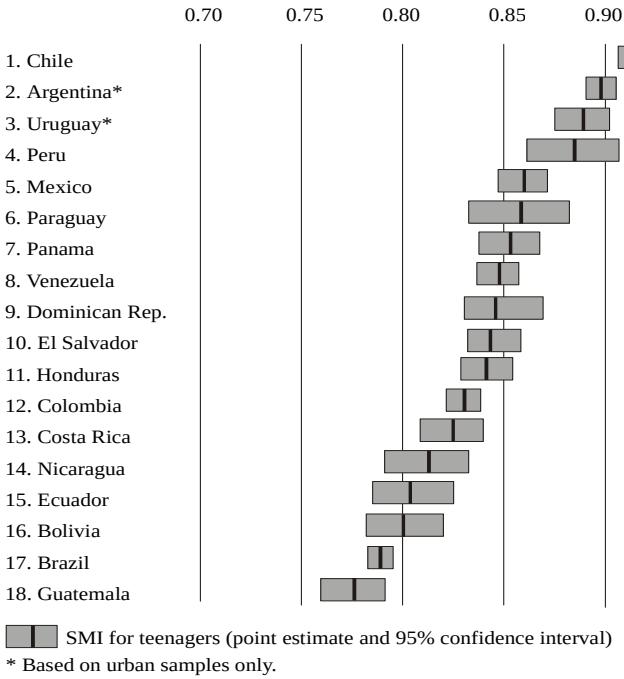
In the discussion part of this paper we correlate our Social Mobility estimates with various macro level variables. They have all been found on the homepage of the Inter-American Development Bank and are shown in Table 6 in Appendix C.

4. Main Results

4.1 Social mobility across countries

Figure 1 (and Table 5 in Appendix B) shows our main social mobility index with 95% confidence bounds. The index is based on teenagers representing the whole country, but in two cases (Argentina and Uruguay) the samples only included urban citizens. These two countries are both highly urbanized (more than 85% of the population living in urban areas), so the urban samples provide a reasonable approximation to a global sample.

Figure 1: Social Mobility Index based on teenagers (13-19 years)



[5] For more information about the variables used for this project, please contact Suzanne Durya (suzanned@iadb.org) at the IADB.

The confidence bounds have been estimated by bootstrapping (100 repetitions) and the span of the confidence interval reflects the number of observations in the sample. The larger the sample, the more narrow the confidence interval.

Chile, Argentina, Uruguay, and Peru stand out as having high social mobility, while Guatemala and Brazil stand out as having very low social mobility. The picture for those in between is less clear since their confidence intervals tend to overlap. However, Bolivia, Ecuador, Nicaragua, Costa Rica, and Colombia all have rather low social mobility.

Appendix D contains full regression results and a full Fields decomposition for one typical country, Colombia. To save space we do not report full regression results for all countries, but they are all very similar to Colombia. The Stata code created to make the Fields decomposition is available from the author upon request.

4.2 Comparison with other social mobility rankings

Two papers from the Inter-American Development Bank have previously attempted to calculate Social Mobility Indices for Latin American countries using household surveys identical or similar to the ones used in this paper. As this study, both attempt to measure how important family background is in determining the schooling gap.

The first of these papers is by Behrman, Birdsall & Székely (1998). They regress the schooling gap on three family background variables (father's years of schooling, mother's years of schooling, and household income) and two dummies (urban and female headed household). Then they calculate the proportion of the variance in the schooling gap that is associated with a weighted average of the family background variables, where the weights are the regression coefficient estimates for these three variables.

The idea is similar to ours, but we include many more explanatory variables in the regressions, and thus, hopefully, get a better specified model, and we use the Fields decomposition to determine the importance of the three family background variables. The advantage of the Fields decomposition is that it is invariant to scaling of the variables. For, example, it is not necessary to translate all incomes into a common currency, as Behrman, Birdsall & Székely had to in order to make their index reasonably comparable across countries.

Instead of both father's and mother's education, we use the maximum of the two, which has the advantage that we can include adolescents who live with only one parent. In addition, it seems likely that the best educated of the parents has greater say in the education decisions of their children.

The correlation between our main Social Mobility Index and their Family Background Immobility Index is -0.71[6]. The two indices agree that Chile, Argentina and Uruguay are the three most socially mobile countries, and Brazil the least mobile[7]. The ranking of those in between differ, but as shown above, the differences are not statistically different. The differences are probably mainly due to their larger age group (10-21 year olds), and the fact that some of our surveys are more recent than theirs.

The second paper on the subject is from Dahan & Gaviria (2000). They also use the schooling gap to calculate their social mobility index, but in order to gauge the influence

[6] When excluding Bolivia, for which Behrman *et al* only had data for urban areas.
[7] Behrman *et al* didn't have data for Guatemala.

of family background, they compare the correlation in gaps between siblings to the correlation in gaps between random adolescents.

The correlation between our main SMI and their index is -0.52, but with little agreement on the ranking. They find Costa Rica, Peru, and Paraguay to be more socially mobile than Chile, and Bolivia, Ecuador, Nicaragua, Colombia, Mexico, and El Salvador to be even less mobile than Brazil. Besides applying a completely different methodology, there is another important difference. Dahan & Gaviria's samples are much smaller than ours, since they need households with at least two siblings in the chosen age range (16-20) in order to calculate correlations.

We think that our index is an improvement over the previous ones for the following reasons. First, our schooling gap regressions are more inclusive and better specified than those in Behrman, Birdsall & Székely, and unlike their indices ours is not sensitive to the scaling of variables. Second, our method includes, on average, 95% of all teenagers, while the Dahan & Gaviria index only includes an average of about 37% of all the adolescents in their selected age group. There is reason to believe that these are not representative of all adolescents in the age group, since adolescents with many siblings are much more likely to be included. Third, our method measures directly what we are interested in – namely the influence of family background on education gaps – while Dahan & Gaviria's method measures this only indirectly.

None of the other indices have been reported with confidence intervals or standard errors, so it is unknown whether the reported differences between countries are in fact significant. Behrman, Birdsall & Székely divide their samples into 559 sub-samples, many of which may be so small that the results cannot be significantly different from each other. They neither report the number of observations in their regressions, nor any standard errors or confidence intervals.

5. Discussion

In this section we will discuss our social mobility results in much more detail and discuss what factors are associated with social mobility.

5.1 Cross-country analysis

Income inequality

One of the main reasons for measures of social mobility being important is that the conventional GINI coefficient does not capture all, or even the most important part, of the 'fairness' of income distributions.

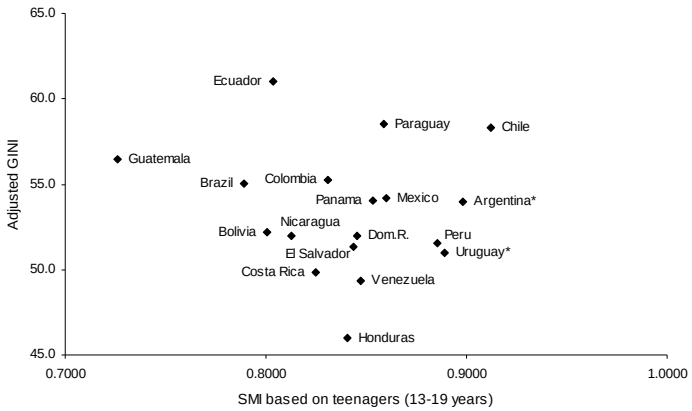
The GINI coefficient is a static measure of inequality, and even if we measure it at several points in time, it does not tell us whether it is the same people that are at the bottom of the distribution every time. A country where income recipients move relatively freely around the income distribution would seem more fair than one where the poor are stuck consistently at the low end. Social Mobility indices are designed to measure that part of 'unfairness'.

Figure 2 compares our measure of Social Mobility with a GINI coefficient for each country. We use a GINI measure that has been adjusted for differences in household survey characteristics, such as coverage, income measure used, and timing (Székely and

Hilgert 1999, Table 5, Column 8), so they should be reasonably comparable across countries.

We see that there is no clear relationship between Social Mobility and Inequality ($\rho = -0.12$). Guatemala, Ecuador, and Brazil are clearly 'unfair' countries, since they have both high income inequality and low social mobility. In those countries, there are large gaps between rich and poor and there is little chance of crossing those gaps.

Figure 2: Social Mobility and income inequality



Notes: Argentina and Uruguay estimates are based on urban populations only. The GINI coefficients are from Székely and Hilgert 1999, which generally uses the same surveys as are used for the social mobility index. However, in a few cases the SMI is based upon a slightly more recent survey than the GINI.

There are no clearly 'fair' countries in our sample. Chile and Argentina have high social mobility, but they also have very high income inequality.

Honduras has reasonably low income inequality (by Latin American standards), but it's social mobility is in the low end.

While low mobility and high income inequality is clearly the worst combination, high mobility and low income inequality is not necessarily the best. High income inequality and high mobility (as in the case of Chile) may provide better incentives for people to study hard, work hard, be innovative, and take risks, because the returns are higher. Better incentives may lead to greater growth in the long run because the work force is better motivated, better educated, more innovative, and less dependent on social safety nets.

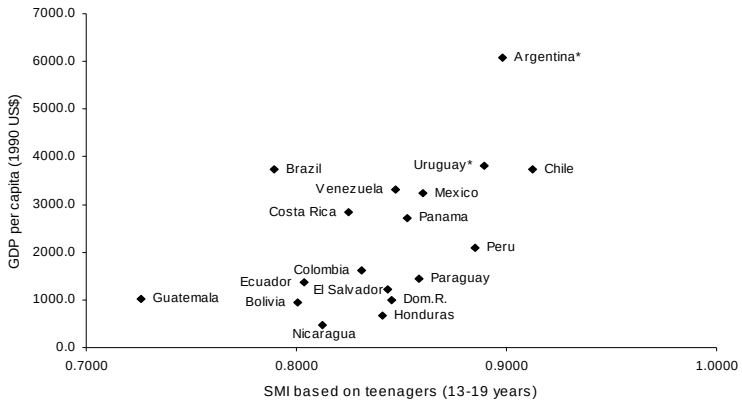
Per capita income

Several theoretical papers have suggested mechanisms through which social mobility and economic growth might be related. Murphy, Scheifer & Vishny (1991), Raut (1996), and Hassler & Mora (1998) all use the idea that intelligent agents may contribute to higher technological growth if they are assigned appropriate positions in the economy (e.g. entrepreneurs rather than workers or engineers rather than lawyers). If social mobility is low, educational attainment and job allocation will depend more on family background and less on intelligence, implying an inefficient education and use of the intelligent people in the society. The authors show (in different types of models) how this can give rise to

multiple equilibria: One with low growth and low social mobility and another with high growth and high social mobility.

The causality between growth and mobility goes in both directions. High social mobility implies a better use of human resources which implies higher growth. High growth rates, on the other hand, facilitate social mobility because the rate of change in the society is higher. In a highly dynamic society children cannot just follow in their parents' footsteps, as they could in a more static society.

Figure 3: Social Mobility and GDP per capita



Note: Argentina and Uruguay estimates are based on urban populations only.

The correlation between our Social Mobility Index and GDP per capita is 0.53 implying that higher per capita GDP is indeed associated with higher social mobility. The correlation is relatively strong, and thus lends evidence to the theoretical arguments stated above.

Figure 3 suggests that Argentina, Chile, and Uruguay are located in high growth – high social mobility equilibria, while Guatemala, Bolivia, Nicaragua, and Colombia are stuck in low growth – low social mobility equilibria (assuming that the higher GDPs are caused by higher long term growth rates).

In contrast to our results, Dahan & Gaviria (2000) did not find any clear correlation between social mobility and per capita income.

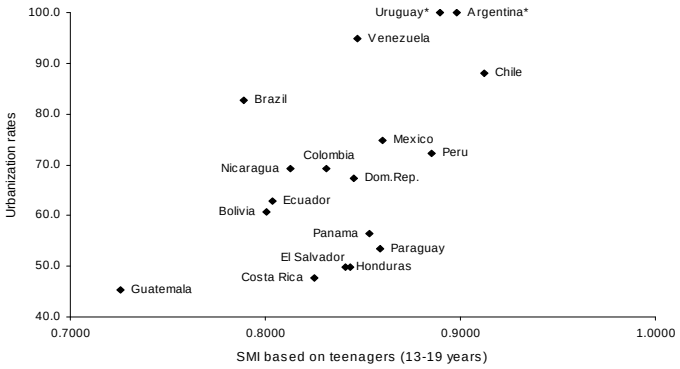
Urbanization rates

There is a tendency for highly urbanized countries to have higher social mobility than less urbanized countries. Probably because it is easier for the governments to provide decent education for everybody, if the children are clustered together in urban centers. Figure 4 shows the relationship, with Argentina and Uruguay having 100% urbanization rates as in the samples used to calculate social mobility.

We could have adjusted the social mobility estimates for Argentina and Uruguay downwards to reflect their actual urbanization rates (87.1 and 85.6, respectively), but the adjustment would be very small and not affect their ranks among the four most mobile countries in the sample.

The positive relationship between urbanization rates and social mobility (ρ = 0.55) lead us to suspect that urban teenagers might be more socially mobile than rural teenagers. However, when dividing the samples by zone, we did not find evidence of that hypothesis. Rural and urban teenagers are affected in approximately the same way by family background. On average, rural teenagers are actually slightly more mobile than urban teenagers, but the difference is not statistically significant. The average SMI for rural teenagers is 0.8725, while it is only 0.8549 for urban teenagers. Bolivia is the only country in the sample where urban teenagers are significantly more mobile than their rural counterparts (SMIs of 0.8841 and 0.8239, respectively).

Figure 4: Social mobility and urbanization rates

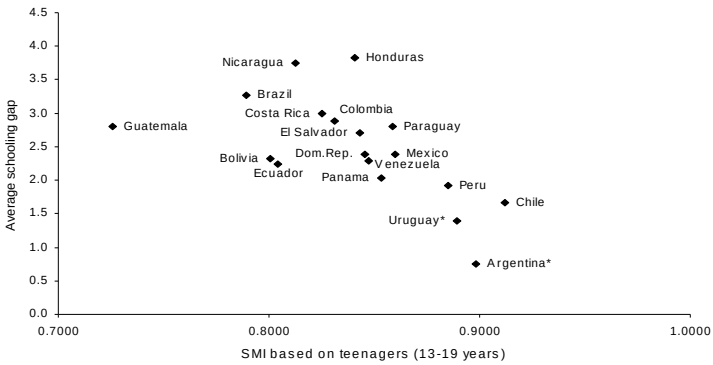


The education system

A free education system of high quality would seem the obvious way to increase social mobility. Theoretically, any teenager could then get the education he wants independent of his family background. His idea of the ideal education may still depend on family background, though, so social mobility need not be perfect.

Figure 5 shows that there is a clear, negative relationship between social mobility and schooling gaps (ρ = -0.60). The lower the average schooling gap the higher the mobility. This makes it likely that countries could improve their social mobility just by reducing schooling gaps. It is not inevitable, however. Bolivia and Ecuador have below average schooling gaps, but still have very low social mobility.

Figure 5: Social Mobility and schooling gaps



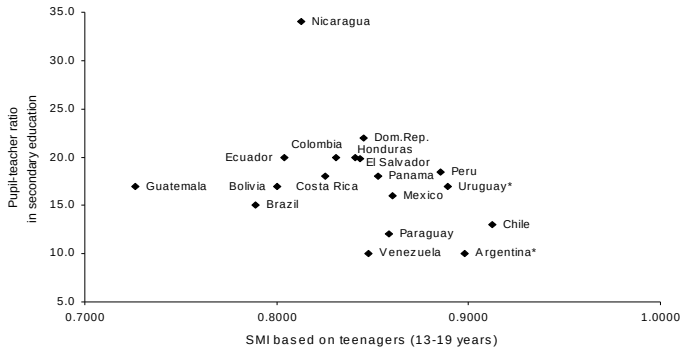
It is interesting to notice that four of the five countries where children start school at age seven instead of age six (i.e. Guatemala, Brazil, Nicaragua, and Honduras), are among the countries with the largest schooling gaps and the lowest social mobility. The correlation between school start age and social mobility is –0.54, and the correlation between school start age and teenage schooling gaps is 0.66, indicating that it might be an advantage to send children to school at age six rather than seven.

One way to reduce schooling gaps is to make sure that the quality of public education is sufficiently high so that students don't drop out simply because the class-rooms are so crowded or the teachers so incompetent that the benefit of attending school is very small.

If we choose the pupil-teacher ratio in secondary education as an indicator of the quality of the public education system, we find Nicaragua among the worst (34 pupils per teacher) and Venezuela and Argentina among the best (10 pupils per teacher). See Figure 6.

The pupil-teacher ratio is weakly correlated to our Social Mobility Index (ρ = -0.31 across countries) implying that better school quality tends to lead to higher social mobility, basically through lowr drop-out rates and smaller schooling gaps.

Figure 6: Social Mobility and pupil-teacher ratios in secondary education



The fact that we cannot control for school quality at the individual level may lead to a bias in the mobility estimate. Usually rich and well-educated families tend to choose better and more expensive private schools than poorer families. Thus, even if the children in poor public schools have a zero schooling gap, they may be way behind the children in expensive private schools. If we could construct and use "quality-adjusted" schooling gaps, we would probably see that family background is more important than when we use simple schooling gaps. This is so because in the latter case we have a lot of children from poor families who appear to have all the schooling they should, but in fact this schooling may not be worth much. The bias is likely to be larger in countries where the public education system covers the population well, but is of very poor quality compared to private schools.

The marriage market

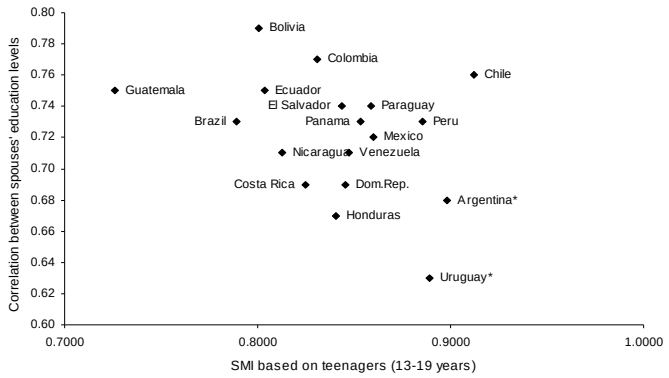
The marriage market can work either to increase or to decrease social mobility, depending on the degree of assortative mating in the country. If people tend to marry only people

from their own class, then social mobility is restrained by marriage customs. If, on the other hand, people often marry outside their class, then social mobility is promoted by the marriage market, and inequality is lower, since resources get spread out more evenly across households.

A simple measure of the degree of assortative mating is the correlation between spouses' education levels, ρ_m. This correlation is generally high in Latin America – ranging from 0.67 in Costa Rica to 0.79 in Bolivia. The corresponding figure for United States in 1990 is 0.62 (Kremer 1996).

Figure 7 shows that there is only a weak negative relationship between spouses' education levels and social mobility (ρ = -0.36). In Bolivia and Columbia, the marriage market contributes to low social mobility as the correlations between spouses' education levels are extremely high. In Uruguay, Honduras and Argentina the less segregated marriage market contributes to higher social mobility. Chile has high social mobility, despite the fact that the correlation between spouses' education levels is among the highest in Latin America.

Figure 7: Social Mobility and assortative mating



Note: Argentina and Uruguay estimates are based on urban populations only, but have been adjusted to be directly comparable to the other estimates.

5.2 Inter-family differences

This section explores differences in social mobility between different types of households. The types we consider are male versus female headed households, dual parent versus single parent households, indigenous versus non-indigenous households, and rural versus urban households.

Female headed households

Just as girls seem to be better educated than boys in most Latin American countries (see section 5.3 below), it appears that teenagers living in female headed households are better off than teenagers living in male headed households.

On average the schooling gaps for teenagers in female headed households are 0.22 years (or 9%) smaller than those in male headed households. For no country in the sample

is it a significant disadvantage to live in a female headed household, although in about half of our countries there is no significant difference.

Single parent households

Most single parent households are headed by women, so it is possible that the single parent dummy rather than the female headed household dummy would pick up the expected disadvantage from living with a single mother.

But contrary to expectations, it is generally not a disadvantage to be a teenager in a single parent household. Only in Ecuador and Paraguay does the single dummy come out significantly positive, thus indicating that the gap is a little higher when living in a single parent household rather than a dual parent household.

Indigenous households

Indigenous teenagers generally have larger schooling gaps than non-indigenous teenagers. We have ethnicity data for six countries in our sample, but only for three countries (Costa Rica, Ecuador, and Guatemala) does the ethnic dummy come out positive. In these three countries being ethnic adds about half a year to the schooling gap. For Bolivia, Brazil, and Peru there were no significant differences between ethnic groups after controlling for other factors.

Rural-urban differences

Both the demand for and the supply of schooling differ dramatically between rural and urban areas in Latin America. Thus, the average gap for teenagers in rural areas is 4.0 years, while it is only 2.2 years in urban areas (see Table 3). On average gaps are 82% higher in rural areas than in urban areas, but there is wide variation across countries. Bolivia has the highest relative difference with 121% larger gaps in rural areas. Guatemala has the largest absolute difference (2.78 years). Brazil, Costa Rica, Paraguay, and the Dominican Republic have the smallest relative differences (less than 50% larger gaps in rural areas).

Some of the difference is explained by differences in characteristics, such as more siblings and a higher proportion of indigenous people. The pure effect of location is only 0.70 years on average, implying that the schooling gap of urban teenagers is 28% smaller than the gap of rural teenagers, when holding everything else constant.

In Bolivia, rural teenagers are significantly less socially mobile than urban teenagers, while in Guatemala and Nicaragua rural teenagers are significantly more mobile than their urban counterparts. For all other countries the difference is not statistically significant.

5.3 Intra-household analysis

In this section we will explore the differences in opportunities between children of the same household. The differences we will consider is gender, birth order, timing of birth, and whether the teenager is a biological child of the head of household.

The reverse gender gap in education in Latin America

Generally, women in developing countries are less likely than men to attend high school – on average there are only 8 women in high school for every 10 men (World Development Report 1999). In Latin America, however, we experience a *reverse gender gap*. In almost all Latin American countries, women are more likely to attend high school than men are, and this anomaly is also reflected in our schooling gaps. Only in Bolivia, Mexico, and Guatemala do women have higher schooling gaps than men have. In the rest of the countries in our sample, women have smaller gaps.

We have not been able to find any explanations in the literature for the reverse gender gap in Latin America, so here we will venture some tentative suggestions, which remain to be empirically tested.

In Latin America, girls have typically contributed greatly to domestic and agricultural work while boys more often have paid jobs outside the house. With the demographic transition and increase in household amenities, however, girls' time on household chores may have been slowly reducing over time. If boys' time has not been freed up in a similar manner, and if girls have not been pushed to work outside the house instead, this might explain how girls have caught up and even surpassed boys in education level[8]. The Latin American culture may also work in favor of the girls' education, since families are much more reluctant to send their daughters out to work than their sons.

It is also possible that the female advantage is only in the length of education and not in the quality of education. With the relatively low labor force participation of women in Latin America, many parents expect a lower return to girls' education than to boys' education. Consequently, cash-constrained families may send their male off-springs to better and more expensive schools, while letting the girls attend cheaper public schools. If such behavior is widespread, then the girls' quantitative advantage may not be big enough to compensate for their qualitative disadvantage.

We do not have the information necessary to test this hypothesis, but can only hope it is not true. If there really is a reverse gender gap then it will have positive long run consequences for the general education level in Latin America, since mothers' education is much more important in determining children's education than fathers' education[9].

In addition, several studies have shown that women's education is important in reducing fertility (e.g. Robbins, 1999), improving health (e.g. Ranis & Stewart, 2000), promoting economic growth (e.g. Klasen, 2000), reducing poverty (e.g. Dollar & Gatti, 2000), and even reducing corruption (e.g. Dollar, Fisman & Gatti, 2000), so there appear to be many benefits deriving from this reverse gap.

Given that female teenagers have more education than male teenagers, we would expect that they are also more socially mobile. To test that hypothesis, we have split our samples by gender and calculated Social Mobility Indices for both males and females. Table 4 shows the results.

On average female teenagers are slightly more mobile than male teenagers, but only in a few countries are they significantly more mobile (Brazil and Venezuela). Bolivia is

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8 This idea was suggested by Suzanne Duryea and Mary Arends-Kuenning from the IADB Research Department.

9 In an earlier version of this paper we used both father's education and mother's education as family background variables rather than the maximum of the two. The results showed that mother's education was at least twice as important in determining variations in schooling gaps as father's education. Behrman, Birdsall & Székely (1998) found the same result.

the only country where boys are significantly more socially mobile than girls, but Bolivia is also one of the few countries where boys are better educated than girls.

Table 3: Schooling gaps for teenagers, by gender and zone

Country	Average education gap	Male Education gap	Female education gap	Gender gap
Argentina, urban '96	0.71	0.88	0.52	Reversed
Bolivia '97	2.36	2.24	2.49	Normal
Rural	3.73	3.33	4.17	Normal
Urban	1.69	1.66	1.73	Normal
Brazil '97	4.37	4.74	4.01	Reversed
Rural	5.91	6.34	5.43	Reversed
Urban	3.96	4.27	3.65	Reversed
Chile '98	1.55	1.66	1.43	Reversed
Rural	2.24	2.41	2.06	Reversed
Urban	1.42	1.52	1.32	Reversed
Colombia '97	3.04	3.27	2.81	Reversed
Rural	4.23	4.56	3.87	Reversed
Urban	2.25	2.33	2.18	Reversed
Costa Rica '98	2.97	3.15	2.77	Reversed
Rural	3.40	3.54	3.23	Reversed
Urban	2.37	2.57	2.17	Reversed
Dom. Rep. '96	2.56	2.98	2.16	Reversed
Rural	3.14	3.53	2.65	Reversed
Urban	2.12	2.45	1.86	Reversed
Ecuador '98	2.28	2.48	2.08	Reversed
Rural	3.12	3.29	2.94	Reversed
Urban	1.62	1.80	1.43	Reversed
El Salvador '98	3.72	3.90	3.54	Reversed
Rural	4.96	5.10	4.81	Reversed
Urban	2.71	2.88	2.55	Reversed
Guatemala '98	5.25	5.09	5.40	Normal
Rural	6.34	6.03	6.66	Normal
Urban	3.56	3.62	3.50	Reversed
Honduras '98	4.17	4.44	3.89	Reversed
Rural	4.92	5.24	4.57	Reversed
Urban	3.20	3.35	3.06	Reversed
Mexico '96	2.32	2.28	2.36	Normal
Rural	3.16	3.08	3.24	Normal
Urban	1.70	1.68	1.72	Normal
Nicaragua '98	4.48	4.84	4.12	Reversed
Rural	5.91	6.23	5.57	Reversed
Urban	3.30	3.60	3.03	Reversed
Panama '97	1.96	2.23	1.69	Reversed
Rural	2.67	2.92	2.37	Reversed
Urban	1.49	1.71	1.28	Reversed
Paraguay '95	2.90	3.09	2.71	Reversed
Rural	3.53	3.69	3.34	Reversed
Urban	2.37	2.53	2.23	Reversed
Peru '97	1.90	1.94	1.87	Reversed
Rural	2.81	2.71	2.92	Normal
Urban	1.41	1.51	1.31	Reversed
Uruguay, urban '97	1.43	1.64	1.24	Reversed
Venezuela '97	2.33	2.74	1.91	Reversed
Un-weighted average	**3.01**	**3.19**	**2.83**	**Reversed**
Rural	**4.00**	**4.13**	**3.83**	**Reversed**
Urban	**2.19**	**2.35**	**2.05**	**Reversed**

Source: Authors' calculations using teenagers (13-19 year old).

Table 4: Social Mobility by gender

	SMI for teenagers		
Country	**Male**	**Female**	**Most mobile****
Argentina*	0.8923	0.9035	Equal
Bolivia	0.8282	0.7696	Male
Brazil	0.7727	0.7987	Female
Chile	0.9000	0.9237	Equal
Colombia	0.8245	0.8349	Equal
Costa Rica	0.8195	0.8270	Equal
Dominican Republic	0.8191	0.8623	Equal
Ecuador	0.7817	0.8273	Equal
El Salvador	0.8318	0.8525	Equal
Guatemala	0.7342	0.7160	Equal
Honduras	0.8405	0.8380	Equal
Mexico	0.8654	0.8558	Equal
Nicaragua	0.8122	0.8083	Equal
Panama	0.8416	0.8642	Equal
Paraguay	0.8504	0.8644	Equal
Peru	0.9088	0.8574	Equal
Uruguay*	0.9017	0.8696	Equal
Venezuela	0.8210	0.8706	Female
Average	**0.8359**	**0.8413**	**Equal**

*Argentina and Uruguay include only urban citizens.
** Using a 5% significance level.

Life-cycle effects

If a child is born early in the life cycle of the parents there will usually be fewer resources available for the education of the child. We have attempted to capture this effect by including in our schooling gap regressions a variable measuring the age of the household head at the time of the birth of the teenager. The estimated coefficients came out negative for all countries and usually highly significant (average t-statistic of -8.0). The average coefficient estimate across countries was –0.018, which implies that a child born to a 30 year old household head is likely to have a schooling gap that is 0.18 year (or approximately 7%) smaller than a child born to a 20 year old household head.

The life cycle effect is larger in urban areas than rural areas. Here a teenager born to a head of household ten years later in life would have a 13% smaller gap.

Birth order effects

The number and order of siblings were also found to be important. Generally a higher number of siblings increases a teenagers schooling gap, but it is not unimportant what kind of siblings he/she has. The presence of a younger sister, a younger brother, or an older brother would on average increase the gap by 0.26 years. The presence of an older sister, on the other hand, would not on average have any effect on the schooling gap.

Thus, in an hypothetical family who raised first a girl, then a boy, and then a girl, the oldest sister would have a 0.52 year (or 24%) greater schooling gap than the younger

sister. And this is not counting the life-cycle effect, which would further tend to increase the older sisters schooling gap compared to the younger sister's gap.

The effects of siblings are larger in urban areas than rural areas. The estimated coefficients are slightly higher and because the gaps are generally smaller the relative effect is substantially larger. In urban Argentina, for example, an average family who raised first a girl, then a boy, and then a girl, would see that the oldest sister would have a 0.70 year (or 92%) higher schooling gap than the younger sister (again not counting the life-cycle effect).

The conclusion is that it is best for educational attainment to be an only child, or only to have older sisters. Younger siblings or older brothers will tend to divert resources away from any child's education. In urban areas, many siblings are more of a disadvantage than they are in rural areas.

Extended families

Many parents in Latin America raise children other than their own. Only a minority of these non-biological children are formally adopted, in which case they would be counted the same way as the biological children. Most of these children are just accepted as part of the family as a favor to relatives or friends who are unable to take care of their own children. As "adopted" we count all the teenagers living in the household who are not spouses, sons or daughters of the household head, who are not maids or relatives to maids, and who are not tenants or guests[10]. By this definition, "adopted" teenagers account for about 15.7% of all teenagers, so it is not an insignificant group.

Adopted children, with this very broad definition, have significantly larger schooling gaps than the household heads' own children. On average the schooling gap is 0.36 years (or 14%) larger than the gap for own children, other things being equal.

This should not be taken as a sign that adopting parents are unfair in their treatment of adopted children relative to their treatment of their own children. Serious disruptive events may have taken place in the child's life prior to adoption, and these events may easily have caused the child to miss several months of school. Indeed, the child is likely to be benefit from the fact that some relative or friend is willing to take him aboard, and it may even be his only chance of continuing his education.

5.3 Teenagers versus young adults

In this paper we have chosen to focus exclusively on teenagers (aged 13-19) in our analysis of social mobility. This choice reflects a trade-off between the desire to analyze young people's education decisions late enough that they have passed the compulsory part of their education but still early enough that remain at home.

Our method is limited to the share of adolescents who live at home with at least one parent figure, and this share is substantially higher and more stable across countries for teenagers than it is for young adults. The adolescents that our method ignores are those who have formed their own households (i.e. are heads or spouses), and those who work as

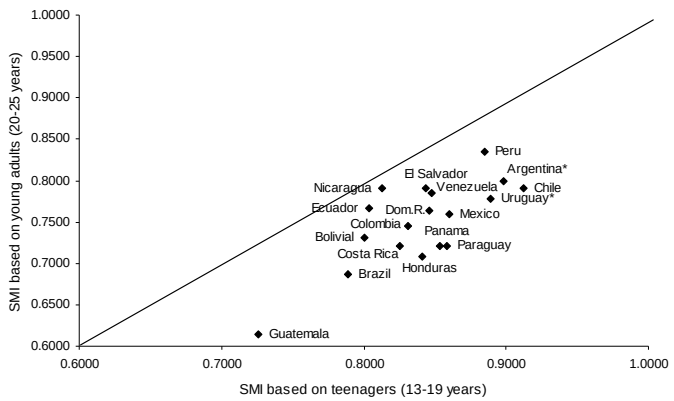
[10] For technical reasons, the group of adopted teenagers includes grand children to heads of households, even if the parents of the children live in the house also.

live-in household help[11]. These two groups comprise only about five percent of teenagers, but about 46% of all adolescents. Since the young people who leave home relatively early may be substantially different from those who live with their parents until far up in their twenties, we suspect that using the later age-group would lead to serious biases due to exclusion.

However, it is possible to argue that the high level of social mobility found in Chile, Argentina, and Uruguay is mainly due to the high level of education in these countries. If school is basically compulsory until the 18th year (12 years of schooling), then family background will not have much effect. There is some truth to this argument, as indicated by the strong correlation between teenage schooling gaps and teenage social mobility (ρ = -0.60).

In order to see how much of a difference it would make if we chose a later age group, we calculated our social mobility estimate based on young adults (aged 20 - 25). The correlation between social mobility estimates based on teenagers and social mobility estimates based on young adults is 0.75 across the 18 countries. Figure 8 shows the relationship.

Figure 8: Comparison of Social Mobility Indices based on teenagers and on young adults



Note: * Argentina and Uruguay estimates are based on urban populations only.

Note that Chile, Peru, and Argentina are among the four most socially mobile countries both when measured on teenagers and when measured on young adults. Guatemala and Brazil are the two least socially mobile countries by both measures.

6. Conclusions and Policy Implications

This paper has proposed a new measure of social mobility, which can be calculated from ordinary household surveys rather than the more rare longitudinal surveys typically used to measure intergenerational mobility.

Our Social Mobility Index is based on schooling gap regressions for teenagers (13-19 year olds), and uses the Fields decomposition to determine the importance of family background in explaining their schooling gaps. When family background is important in

[11] Homeless adolescents are of course also left out, as they would never be included in a household survey.

determining schooling outcomes, we say that social mobility is low. Conversely, if family background is unimportant, we say that social mobility is high.

The method was applied to household surveys from 18 different Latin American countries conducted in the late 1990s. The process yielded results at two levels. First, the schooling gap regressions provided us with a lot of information about the differences in opportunities between individuals within any given country and even within any given household. Second, our cross-country analysis of social mobility provided some indication on the factors that are associated with social mobility. In the remainder of this section we will try to extract the policy implications that arise from this research.

At the micro-level we found that the age of the household head at the birth of the teenager was highly significant and negative in all countries, implying that children who are born early in the life-cycle of the parents have higher schooling gaps than children who are born later. The reason for this relationship is that young parents have not had time to get firmly rooted in the labor market, so their income is lower and more erratic at the time when they have to make schooling decisions for their child.

Low and erratic income may affect the education decision in several different ways. First, poor parents may decide to postpone school start in order to postpone the costs. Even if the school is free, there are costs in terms of school uniforms and other supplies, transportation costs, loss of work from the child, and loss of work from the parent who have to make inscription, walk the kid to school, help with homework, etc. Second, the parents may choose the cheapest school rather than the best school. This won't show immediately in our schooling gap measure, but being in a poor school seriously reduces the possibilities for continued study at secondary and tertiary levels. Third, poor parents may let their kids drop out of school early because they need the income they can generate in the labor market. Fourth, young parents who are not yet established in the labor market, may move around a lot to search for opportunities. Such moving may be highly disruptive for a child's schooling. Fifth, young parents have probably had to terminate their education early in order to take care of their kids, and such behavior has a tendency to transmit to the next generation.

The strong evidence of the life-cycle effect suggests that policies targeted at preventing early child-bearing would be beneficial for both parents and children. If young people can postpone the arrival of their first child until they have finished their desired level of education and has gotten a foothold in the labor market, then they have much more freedom to choose how they want to live their life and how they want to educate their children. If they get their first child before they have finished their education, they are likely to drop out of school, be unable to find a decent job, and be unable to give everything they really wanted to their child.

Another very clear result from our regression is that each younger sibling that arrive in the family, will divert resources away from the older siblings. So a girl born to very young parents, who keep having more children, is unlikely to get much schooling at all.

The clear evidence that the oldest siblings are disadvantaged with respect to schooling suggests that it would be better to subsidize the first children's education rather than the education of younger siblings. Currently most schools charge full fees for the first child and then reduced fees for additional siblings. It would make more sense if the first children were subsidized, while number three or higher should pay full price. The latter would provide an incentive to reduce the number of children to the benefit of the children already born. In practice such an incentive system would be more difficult to administrate,

though, since it cannot be left to the schools, but has to be administered by a government agency.

Our micro results also show that girls in most Latin American countries receive more education than boys do. This is very good news, since mothers' education is the single most important determinant of children's education. In addition, other studies have shown that women's education is important in reducing fertility, improving health, reducing poverty, reducing inequality, and reducing corruption, so there appears to be many benefits deriving from this reverse gender gap.

However, with the current data we cannot rule out that the female advantage may just be in the quantity of education and not in the quality of education. Some parents, expecting their girls to future to be determined by marriage rather than education, may choose to send their boys to expensive private schools, while letting their girls attend cheap public schools.

In any case, it would be interesting to investigate the unusual reverse gender gap in Latin America further. Are girls really better educated, and, if so, why? Given the key role mothers' education play in the future of children, this topic is well worth further attention.

At the macro level, we first showed that there is no apparent relationship between social mobility and income inequality. They are really two complementary measures. High income inequality can be good if it is accompanied by high social mobility (as in the case of Chile), or it can be bad if it is accompanied by low social mobility (as in the case of Guatemala). In the first case the prospects for long run growth look good, because people have strong incentives to study hard, work hard, take risks, and be innovative. In the second case the prospects for growth look bleak, because people do not have good incentives. Rich people don't have much incentive to work because they were born rich and they are going to stay rich. Poor people don't have any incentive to work hard, either, because they are very unlikely to move to a higher social strata no matter how concentrated they study or how hard they work.

Given that all Latin American countries have high income inequality, they should try to encourage social mobility in order to take advantage of the incentives that high inequality offer. Encouraging social mobility basically requires making high quality education available for all, which means vastly improving the quality of public education systems.

We also showed that social mobility is strongly correlated with per capita GDP. High social mobility and high growth seem to reinforce each other, because countries with high social mobility can make better use of their human capital. Essentially, high mobility allows people to apply their talents in the best way. Most Latin American countries, however, seem to be stuck in a low growth – low social mobility equilibrium. The low mobility means that the richest kids, rather than the smartest kids, get to study and occupy the most important positions in the society, and there is thus a lot of wasted talent in the population. The strong empirical correlation between per capita GDP and social mobility, adds another incentive for governments to try to improve social mobility.

A final point of policy interest is that countries that require the children to start school at age seven rather than at age six, seem to perform worse both with respect to schooling gaps and with respect to social mobility. It seems that sending children to school earlier reduces the risk of drop-out, especially among the poor.

This paper has argued all the way through that it is a clear advantage to have high social mobility in a country. Not only is high social mobility related to high growth rates,

both theoretically and empirically, but it also seems more fair if it is not the same families who are stuck at the bottom of the income distribution period after period and generation after generation. High social mobility allows children of poor and uneducated families to escape poverty and illiteracy, since they have pretty much the same opportunities for education as richer kids. But of course there is a flip side to that argument. If family background is unimportant, then the rich and well-educated do not have much influence on their kids' education outcomes, either. However, the frustration that some rich families may feel if their kids drop out of high school does ring a little hollow compared to the pride and relief poor families must experience when their kids graduate and become able to sustain themselves and their extended families.

7. References

Altonji, Joseph G. & Thomas A. Dunn, 1995. "The effect of school and family characteristics on the returns to education." NBER Working Paper #5072.

Behrman, Jere R., Nancy Birdsall & Miguel Székely, 1998. "Intergenerational Schooling Mobility and Macro Conditions and Schooling Policies in Latin America." Inter-American Development Bank, Office of the Chief Economist, Mimeo.

Behrman, Jere R. & Paul Taubman, 1986. "Birth Order, Schooling, and Earnings." *Journal of Labour Economics*, Vol. 4, pp. 127-131.

Binder, Melissa & Christopher Woodruff, 1999. "Intergenerational Mobility in Educational Attainment in Mexico." Department of Economics, University of New Mexico and Graduate school of International Relations and Pacific Studies, University of California – San Diego. http://papers.ssrn.com/paper.taf?ABSTRACT_ID=166388

Dahan, Momi & Alejandro Gaviria, 2000. "Sibling Correlations and Social Mobility in Latin America." Inter-American Development Bank, Office of the Chief Economist. Draft, March.

Dollar, David, Raymond Fisman & Roberta Gatti, 2000. "Are Women Relly the "Fairer" Sex? Corruption and Women in Government" World Bank. Paper prepared for the forthcoming Policy Research report on Gender and Development.

Dollar, David & Roberta Gatti, 2000. "Gender Inequality, Income, and Growth: Are Good Times Good for Women?" World Bank. Paper prepared for the forthcoming Policy Research report on Gender and Development.

Fields, Gary S. 1996. "Accounting for Differences in Income Inequality", Draft, School of Industrial and Labor Relations, Cornell University, January.

Fields, Gary S. 1997. "Accounting for Income Inequality and Its Change", Paper presented at the annual meetings of the American Economic Association, New Orleans, January6.

Gaviria, Alejandro, 1998. "Intergenerational Mobility, Siblings' Inequality and Borrowing Constraints" Department of Economics, University of California, San Diego, Discussion Paper 98-13. May.

Hassler, John & José V. Rodríguez Mora, 1998. "IQ, Social Mobility and Growth." Seminar Papers No. 635, Institute for International Economic Studies, Stockholm University. January.

Jensen, Robert T. 1999. "Patterns, Causes and Consequences of Child Labour in Pakistan." John F. Kennedy School of Government and Center for International Development, Harvard University. Preliminary draft.

Klasen, Stephan, 2000. "Does Gender Inequality reduce Growht and Development? Evidence from Cross-country Regressions" World Bank. Paper prepared for the forthcoming Policy Research report on Gender and Development.

Lam, David, 1999. "Generating Extreme Inequality: schooling, Earnings, and Intergenerational Transmission of Human Capital in South Africa and Brazil." Population Studies Center, University of Michigan. Research Report No. 99-439.

Moulton, Brent R. 1986. "Random Group Effects and the Precision of Regression Estimates", *Journal of Econometrics* **32**: 385-397.

Murphy, Kevin M., Andrei Scheifer and Robert W. Vishny, 1991. "The Allocation of Talent: Implications for Growth", *Quaterly Journal of Economics*, Vol 106(2): 503-530.

Ranis, Gustav and Frances Stewart. 2000. "Strategies for Success in Human Development." Queen Elizabeth House, University of Oxford, Working Paper Number 32. January.

Raut, Lakshmi K., 1996. "Signalling equilibrium, Intergenerational mobility and long-run growth." University of Hawaii-Manoa. Draft. February.

Robbins, Donald J., 1999. "Gender, Human Capital and Growth: Evidence from Six Latin American Countries". OECD Development Centre. Technical Papers No 151. September.

Székely, Miguel & Marianne Hilgert, 1999. "What's Behind the Inequality We Measure: An Investigation Using Latin American Data for the 1990s." Research Department at the Inter-American Development Bank. Draft, December 3.

APPENDIX A: A theoretical derivation of the Fields decomposition

Consider a standard earnings regression:

$$Y = \sum_j a_j Z_j$$

where Y is a vector of log wages for all individuals in the sample and Z is a matrix with j explanatory variables, including an intercept, years of education, experience, experience squared, gender, etc for each individual.

A simple measure of inequality is the variance of the log wage. We therefore take the variance on both sides of the earnings equation. The right hand side can be manipulated using the following theorem:

> **Theorem (Mood, Graybill, and Boes):** Let $Z_1,\ldots,Z_J$ and $Y_1,\ldots,Y_M$ be two sets of random variables and $a_1,\ldots,a_J$ and $b_1,\ldots,b_M$ be two sets of constants. Then

$$\operatorname{cov}\left[\sum_{j=1}^{J} a_j Z_j ; \sum_{m=1}^{M} b_m Y_m\right] = \sum_{j=1}^{J}\sum_{m=1}^{M} a_j b_m \operatorname{cov}\left[Z_j, Y_m\right]$$

Applying the theorem in the context of a single random variable $Y=\sum_j a_j Z_j$, we have

$$\operatorname{cov}\left[\sum_{j=1}^{J} a_j Z_j ; Y\right] = \sum_{j=1}^{J} \operatorname{cov}\left[a_j Z ; Y\right]$$

But since the left-hand side of this expression is the covariance between Y and itself, it is simply the variance of Y. Thus,

$$\sigma^2(Y) = \sum_{j=1}^{J} \operatorname{cov}\left[a_j Z_j ; Y\right]$$

Or, upon dividing through by $\sigma^2(Y)$,

$$1 = \frac{\sum_{j=1}^{J} \operatorname{cov}\left[a_j Z_j ; Y\right]}{\sigma^2(Y)} \equiv \sum_{j=1}^{J} s_j ,$$

Where each s_j is given by

$$s_j = \frac{\operatorname{cov}\left[a_j Z_j ; Y\right]}{\sigma^2(Y)} = \frac{a_j \cdot \sigma(Z_j) \cdot cor\left[Z_j ; Y\right]}{\sigma(Y)}.$$

The s_j's are the factor inequality weights and they add to 1 over all explanatory factors. Each s_j is decomposable in an intuitively appealing manner. For example, years of education (edu) explains a larger share of income inequality:

- The higher the regression coefficient on education (a_{edu}) in the earnings regression.
- The higher the standard deviation of years of education (σ_{edu}).
- And the higher the correlation between education and earnings (cor(edu,Y)).

Fields (1996) also shows that this decomposition carries over to other commonly used inequality measures, such as the Gini coefficient, the Atkinson index, the generalized entropy family, as well as the log variance.

APPENDIX B: Social Mobility estimates

Table 5: SMI estimates with 95% confidence intervals for teenagers and young adults

Country	**SMI teenagers (13-19)**	*SMI teen lower bound*	*SMI teen upper bound*	**SMI young adults (20-25)**	*SMI young adults lower bound*	*SMI young adults upper bound*
Argentina*	0.1017	*0.0941*	*0.1093*	0.1847	*0.1687*	*0.2026*
Bolivia	0.1487	*0.1343*	*0.1617*	0.2076	*0.1715*	*0.2489*
Brazil	0.1880	*0.1836*	*0.1931*	0.2455	*0.2349*	*0.2553*
Chile	0.0880	*0.0804*	*0.0969*	0.1969	*0.1814*	*0.2081*
Colombia	0.1570	*0.1496*	*0.1648*	0.2193	*0.2066*	*0.2310*
Costa Rica	0.1534	*0.1405*	*0.1650*	0.2389	*0.2119*	*0.2776*
Dominican Republic	0.1401	*0.1219*	*0.1626*	0.1786	*0.1444*	*0.2193*
Ecuador	0.1867	*0.1711*	*0.2051*	0.2343	*0.2009*	*0.2744*
El Salvador	0.1529	*0.1429*	*0.1666*	0.1788	*0.1637*	*0.2118*
Guatemala	0.1581	*0.1407*	*0.1750*	0.1590	*0.1304*	*0.1913*
Honduras	0.1570	*0.1406*	*0.1688*	0.2613	*0.2252*	*0.2912*
Mexico	0.1391	*0.1288*	*0.1489*	0.2287	*0.2106*	*0.2513*
Nicaragua	0.1589	*0.1431*	*0.1755*	0.1649	*0.1365*	*0.1970*
Panama	0.1297	*0.1134*	*0.1445*	0.2144	*0.1849*	*0.2464*
Paraguay	0.1212	*0.1043*	*0.1410*	0.2334	*0.1863*	*0.2946*
Peru	0.1309	*0.1133*	*0.1517*	0.1574	*0.1356*	*0.1916*
Uruguay*	0.1147	*0.1033*	*0.1261*	0.2080	*0.1864*	*0.2296*
Venezuela	0.1631	*0.1497*	*0.1739*	0.2446	*0.2182*	*0.2698*
Average	**0.1448**			**0.2042**		

Source: Authors' calculations based on household surveys.

Note: Argentina and Uruguay estimates are based on urban populations only, but have been adjusted to fit their actual urbanization rates (87.1% and 85.6%). They should therefore be directly comparable to the other estimates.

APPENDIX C: Macro data

Table 6: Macro economic variables used for correlation analysis in Section 5

Country	Adjusted GINI (a)	GDP per capita (b)	% of pop. living in urban areas (c)	Pupil-teacher ratio in secondary education (d)	Correlation between spouses education levels (e)	Land area (1000 km^2) (f)	Rural pop. density (g)
Argentina	53.95	6068.7	87.1	10	0.68	2767	1.7
Bolivia	52.17	946.7	60.8	17	0.79	1099	2.8
Brazil	55.07	3194.1	82.6	15	0.72	8512	3.4
Chile	58.33	3739.6	88.1	13	0.76	757	2.3
Colombia	55.24	1616.9	69.3	20	0.77	1139	11.0
Costa Rica	49.86	1994.6	47.8	18	0.67	51	39.4
Dominican Rep.	51.95	992.5	67.4	22	0.69	49	54.8
Ecuador	60.99	1368.7	62.8	20	0.75	284	15.9
El Salvador	51.30	1308.8	49.9	19.8	0.74	21	143.8
Guatemala	56.49	1016.6	45.3	17	0.75	108	54.8
Honduras	46.02	671.5	49.8	20	0.67	112	27.6
Mexico	54.20	3263.9	74.9	16	0.72	1973	12.2
Nicaragua	51.96	464.5	69.3	34	0.71	130	11.4
Panama	54.07	2696.9	56.4	18	0.73	77	15.7
Paraguay	58.53	1445.1	53.5	12	0.74	407	6.0
Peru	51.56	2083.1	72.3	18.5	0.73	1285	5.4
Uruguay	51.00	3390.7	85.6	17	0.63	176	2.7
Venezuela	49.32	3315.3	94.8	10	0.71	912	1.3
Average	**53.45**	**2014.6**	**62.4**	**18**	**0.72**	**1159**	**22.9**

Sources: (a) Székely and Hilgert (1999, Table 5, Column 8). (b,c,d,g) The Statistics section of the Inter-American Development Bank's homepage. (e) Authors' calculations based on household surveys. (f) World Development Report (1994).

Notes: (a) The adjusted GINI should be reasonably comparable across countries, since it is based on the largest comparable income measure (labor income in urban areas) and adjusted for seasonal differences. Years vary, but coincide with the year of the survey in most cases.
(b) Refers to the year of the survey but is measured in fixed 1990-USD.
(c) 1998.
(d) Refers to the year of the survey (or the closest available).
(e) Refers to the year of the survey.
(g) 1998.

APPENDIX D: Regression results and Fields decomposition for Colombia 1997

```
. * Fields decomposition for teenagers
. fields edugap hhypc maxedu hhhage femhhh single kidsis kidbro oldsis oldbro
woman edad adopt rurselfh urbselfh avreginc avregedu urban impyA_h if teen==1

Regression with robust standard errors                Number of obs =   20279
                                              F( 18,    23) = 1270.66
                                              Prob > F      =  0.0000
                                              R-squared     =  0.3942
Number of clusters (region) = 24                      Root MSE      =  2.1063
```

edugap	Coef.	Robust Std.Err.	t	p>|t|	[95% Conf. Interval]	
hhypc	-.1311743	.0202104	-6.490	0.000	-.1729828	-.0893658
maxedu	-.2063958	.0099163	-20.814	0.000	-.2269093	-.1858823
hhhage	-.021367	.0023355	-9.149	0.000	-.0261983	-.0165357
femhhh	-.1384118	.0824865	-1.678	0.107	-.3090481	.0322245
single	-.0923255	.0858135	-1.076	0.293	-.2698443	.0851933
kidsis	.300141	.0279096	10.754	0.000	.2424055	.3578765
kidbro	.3179825	.0366565	8.675	0.000	.2421528	.3938122
oldsis	.0312519	.038279	0.816	0.423	-.0479343	.1104381
oldbro	.3244019	.0337838	9.602	0.000	.2545148	.3942889
woman	-.5719596	.0431029	-13.270	0.000	-.6611247	-.4827944
edad	.4797143	.0234412	20.465	0.000	.4312226	.528206
adopt	.4390392	.0588618	7.459	0.000	.3172743	.5608041
rurselfh	.1733438	.1045916	1.657	0.111	-.0430203	.3897079
urbselth	.0269456	.0747493	0.360	0.722	-.1276851	.1815762
avreginc	-.131681	.2257881	-0.583	0.565	-.5987593	.3353974
avregedu	.0196536	.0762135	0.258	0.799	-.1380059	.1773131
urban	-1.125841	.1033273	-10.896	0.000	-1.33959	-.9120925
impyA_h	.0674244	.276355	0.244	0.809	-.5042594	.6391083
_cons	.8671943	2.157552	0.402	0.691	-3.596042	5.33043

Hhypc = adult household income per capita
Maxedu = maximum of father's and mother's years of education
hhhage = age of the head of household at birth of teenager
femhhh = dummy for female headed households
single = dummy for single parent households
kidsis = dummy for the presence of younger sister
kidbro = dummy for the presence of younger brother
oldsis = dummy for the presence of older sister
oldbro = dummy for the presence of older brother
woman = dummy if the teenager is female
edad = age of teenager
adopt = dummy if the teenager is not the son or daughter of the head of household
rurselfh = dummy if the head of household is self employed and rural
urbselfh = dummy if the head of household is self employed and urban
avreginc = average regional income
avregedu = average regional education level
urban = dummy if teenager lives in urban area
impyA_h = dummy if household income is imputed by the IDB
_cons = constant.

Fields decomposition and Social Mobility Index

X	Coeff	Sd(X)	Com(X,Y)	F.I.W.
hhypc	-0.1312	1.5331	-0.2883	0.0214
maxedu	-0.2064	4.3261	-0.4470	0.1476
hhhage	-0.0214	11.6194	0.0565	-0.0052
femhhh	-0.1384	0.4286	-0.0120	0.0003
single	-0.0923	0.4407	0.0041	-0.0001
kidsis	0.3001	0.4986	0.1581	0.0087
kidbro	0.3180	0.4967	0.1736	0.0101
oldsis	0.0313	0.4706	-0.0237	-0.0001
oldbro	0.3244	0.4865	0.0699	0.0041
woman	-0.5720	0.4997	-0.1202	0.0127
edad	0.4797	1.9337	0.3213	0.1102
adopt	0.4390	0.3969	0.0667	0.0043
rurselfh	0.1733	0.3494	0.2495	0.0056
urbselth	0.0269	0.4172	-0.1046	-0.0004
avreginc	-0.1317	0.4065	-0.1945	0.0038
avregedu	0.0197	1.0781	-0.2059	-0.0016
urban	-1.1258	0.4691	-0.3726	0.0728
impyA_h	0.0674	0.0876	0.0180	0.0000

Sum of Factor Inequality Weights = 0.3942
Social Mobility Index = 0.8310 (= 1 – 0.0214 – 0.1476)