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Sibling Correlations and Intergenerational Mobility in Latin America*

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In this article, we use sibling correlations in schooling to measure differences in intergenerational mobility for 16 Latin American countries. The results show that there are substantial differences in mobility within Latin America. Social mobility increases with mean schooling and income per capita but is only mildly associated with public expenditures on education.

I. Introduction

In life, there is not a fresh start for each generation. Quite the opposite: life, one might say, is akin to a relay race in which parents hand the baton to their children. This observation, as trite as it might seem, has at least two important implications. First, it implies that policy interventions seeking to increase fairness should aim at "leveling the playing field" rather than at redistributing resources from winners to losers. Second, it implies that social mobility is a much more accurate measure of social justice than inequality.

It is interesting that the debate about social justice in developing countries, especially in Latin America, has been mainly concerned with inequality. This is important because we can argue that had social mobility been given more preeminence, policies would have been different—more concerned with the availability of opportunities and less concerned with compensating the losers. But the neglect of social mobility has been not so much a matter of principle as a matter of necessity. A lack of data has been the main reason why scholars and policy makers have often ignored intergenerational mobility.

In this article, we try to remedy this problem. As is customary in

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the literature, we measure social mobility by looking at the extent to which family background determines socioeconomic success. In practice, social mobility can be measured by means of two distinct types of correlations: intergenerational correlations and sibling correlations.[1] Both measures rely on a simple premise. If family background does matter, we should observe some connection between the fate of parents and children on the one hand and the fate of siblings on the other. These two measures differ greatly in terms of data requirements. While computing intergenerational correlations often requires repeated observations of the same family over long periods of time, computing sibling correlations is possible on the basis of cross-sectional data sets.

We propose an index of social mobility for developing countries based on the correlation of schooling among siblings. Our index measures the extent to which educational outcomes can be explained by family background. If there were perfect social mobility, family background would not matter, siblings would not be more alike than two people taken at random, and our index would be close to zero. If there were little mobility, family background would matter very much, siblings would be very similar, and our index would be close to one.

The main advantage of our index is that it can be computed on the basis of the information found in most household surveys. Our index is based on the assumption that children who have fallen behind in terms of schooling by the time they have reached their late teens will have the worst socioeconomic outcomes later in life. Computing our index involves two main steps. First, we have to identify those children who have been left behind in terms of schooling. Then we have to determine the extent to which family background explains their poor performance. To this end, we compute first what we call a "leading indicator of socioeconomic failure" and then compute the correlation among siblings of this indicator. We interpret this correlation as an index of social mobility (or, to be more precise, social rigidity).

We apply our index to a sample of 16 Latin American countries and as a benchmark we also include the United States. We find that social mobility is highly correlated with country-wide education levels and that countries with more schooling and less inequality of schooling allow greater mobility. We also find that social mobility is not correlated with public expenditures on education as a percentage of GDP and is only tenuously correlated with GDP per capita.

A few recent studies have investigated the connection between family background and schooling in developing countries. J. Behrman, N. Birdsall, and M. Szekely studied the connection between parental attributes (income and education, in particular) and children's outcomes, measuring social mobility as the proportion of the children's differences in schooling because of observable parental attributes.[2] D. Filmer and L. Pritchett investigated the connection between levels of education and

family wealth by computing for a large sample of developing countries' differences in schooling among teenagers from different socioeconomic backgrounds.[3] Both studies found a strong connection between educational levels and mobility; that is, countries with higher levels of education exhibit higher intergenerational mobility (India is the exception that confirms the rule).

Other studies have examined social mobility within specific countries, including D. Lam and R. Schoeni on family background and the returns to education in Brazil and that of C. Woodruff and M. Binder on the intergenerational transmission of schooling in Mexico.[4] Because these studies used different methodologies and dissimilar data sets, few general conclusions can be drawn. One point remains clear, however. Social mobility seems to increase steadily with income per captita both across regions and over time.

In this article, we also investigate the connection between assortative mating and inequality. We find a strong connection between the overall level of inequality and the degree of sorting in marriage markets (measured by the correlation of spouses' schooling). Although definitive interpretations are difficult, this result is consistent with a wealth of recent studies that underscore the role of sorting and segregation in the creation of inequality.

We organize this article as follows. Section II describes the main data sources, Section III presents the empirical strategy, Section IV presents our mobility results along with some exploratory correlations, Section V presents the evidence on assortative mating, and Section VI concludes.

II. Data

Most of the data that we use in this article come from household surveys. A description of the surveys, including names, coverage, and sample sizes, is presented in table 1. All the surveys are for the late 1990s and are representative of each country's population, with the exceptions of Argentina and Uruguay, where only urban data are available. The sample sizes differ widely across countries. They are very large in Brazil, Chile, and Colombia and much smaller in Argentina, Nicaragua, and Peru.

Although the surveys use different sampling methodologies and include different questions, they allow meaningful cross-country comparisons, at least in terms of income and education outcomes. The same set of surveys has also been used in studies dealing with the sources of inequality in Latin America and the interplay between labor supply and demographics.[5]

III. Empirical Strategy

In this article, we propose an index of intergenerational mobility for developing countries that, unlike the standard measures of social mobility,

TABLE 1

MAIN FEATURES OF HOUSEHOLD SURVEYS

COUNTRY	YEAR	SAMPLE SIZE		COVERAGE	NAME OF THE SURVEY
		Households	Individuals		
Argentina	1996	3,459	11,749	Urban	Encuesta Permanente de Hogares
Bolivia	1997	8,461	36,752	National	Encuesta Nacional de Empleo
Brazil	1996	105,059	331,263	National	Pesquisa Nacional por Amostra de Domicillos
Chile	1996	33,636	134,262	National	Encuesta de Caracterización Socioeconomica Nacional
Colombia	1997	32,441	143,398	National	Encuesta Nacional de Hogares-Fuerza de Trabajo
Costa Rica	1995	9,631	40,613	National	Encuesta de Hogares de Propósitos Múltiples
Dominican Republic	1996	5,548	24,041	National	Encuesta Nacional de Fuerza de Trabajo
Ecuador	1995	5,810	26,941	National	Encuesta de Condiciones de Vida
El Salvador	1995	8,482	40,004	National	Encuesta de Hogares de Propósitos Múltiples
Mexico	1996	14,042	64,916	National	Encuesta Nacional de Ingreso Gasto de los Hogares
Nicaragua	1993	4,458	24,542	National	Encuesta Nacional de Hogares sobre Medición de Niveles de Vida
Panama	1997	9,875	40,320	National	Encuesta de Hogares
Paraguay	1995	4,667	21,910	National	Encuesta de Hogares
Peru	1997	3,843	19,745	National	Encuesta Nacional de Hogares sobre Medición de Niveles de Vida
Uruguay	1995	20,057	64,930	Urban	Encuesta Continua de Hogares
United States	1996	50,311	131,854	National	Consumer Expenditure Survey
Venezuela	1997	15,948	76,965	National	Encuesta de Hogares por Muestreo

can be computed on the basis of the information found in most household surveys. In this way, we are able to circumvent, at least to some degree, the lack of panel information that has hitherto hindered the study of intergenerational mobility in all but a few developed countries.

At first glance, we can learn very little about intergenerational relations from household surveys. Not only do we observe parents and children at very different ages, but we also observe children so early in their lives that little can be inferred about their socioeconomic performance later in life. Put differently, household surveys provide a snapshot so early in the race for socioeconomic success that little can be said about what will happen at the finish line.

The previous problem notwithstanding, there is a group of children for whom a prediction regarding future socioeconomic outcomes can be made on the basis of the schooling information reported by all household surveys, children who have fallen so far behind that any hope of catching up seems impossible. Thus even though the race for socioeconomic status is long and unsteady and our vantage point on the race is far from the finish line, we can safely identify the losers as those who have been largely outdistanced right from the beginning. Once we have identified them, we can examine the extent to which family background determines their bad outcomes and, therefore, compare the degree of mobility among the countries under scrutiny.

Thus, the main hypothesis of this article (the hypothesis that allows us to use household surveys to study intergenerational mobility) is predicated on a simple premise. In life, as in sports, we do not have to wait until the end of the race to identify who will arrive last—or even very close to last. We certainly have to wait until the end to know who will win, but if we are interested only in those who will arrive last, a glimpse early on in the race may suffice.

The problem is, of course, how to identify the losers—those who have fallen so far behind that their socioeconomic fate is, as it were, sealed. We deal with this problem as follows. We first compute the median schooling for each cohort (we define cohorts on the basis of age and gender) and then use these values to define the relevant thresholds. We assign a value of one to those children whose schooling is greater than the median minus one (those whose fate is still uncertain); we assign a value of zero to all the others (those who have fallen so far behind that socioeconomic success appears to be improbable, to say the least).

By following the procedure sketched above, we compute a "leading indicator of socioeconomic failure." Our indicator is very conservative. We venture to make a guess about future outcomes only for those children who have fallen behind the median levels of education. Figure 1 illustrates our methodology. The figure shows the distribution of years of schooling for 18-year-old Brazilian males along with our leading indicator of socioeconomic failure. Those with 6 or more years of schooling

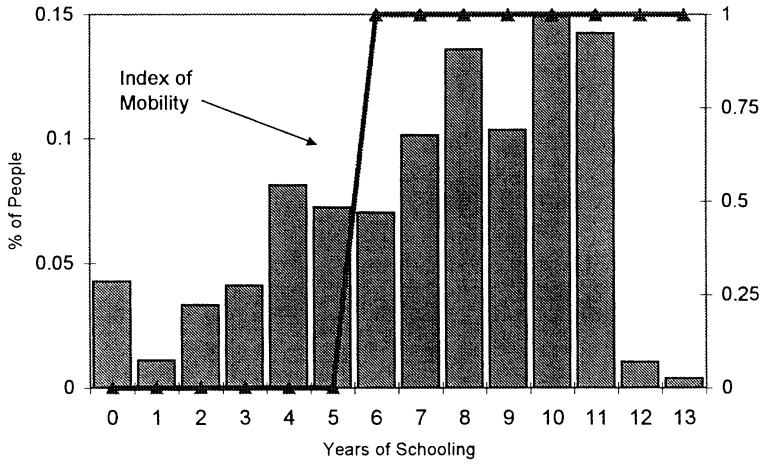


FIG. 1.—Distribution of schooling and index of socioeconomic failure: Brazil, 18-year-old males.

are given a value of one, and those with 5 or fewer years of schooling are given a value of zero.

We impose two sample restrictions in our analysis. First, we restrict all samples to children between 16 and 20 years of age. This restriction reflects a compromise between two opposing factors: narrow age groups reduce sample sizes, on the one hand, but allow more meaningful comparisons of schooling outcomes, on the other (ideally, we should compare only those children who are making the same marginal schooling decisions). And second, we restrict the samples to households with two or more children in the specified age range.

It is important to emphasize that our indicator of socioeconomic failure is based on the median of schooling within specific age and gender categories. We do not compare males with females, nor do we compare children of different ages. This is important not only because schooling varies with age as children move from one grade to the next but also because schooling may vary with gender. If we do not take these variations into account, we may misjudge the importance of family background in important ways. For example, a society where girls get much more education than boys do will appear more mobile than it actually is if we do not control for gender differences. Similarly, a society where most people do not leave school until they are well into their twenties will appear more mobile if we do not control for age.

In this article, we compare countries that differ substantially in terms of average education levels. While in some countries almost the entire population finishes high school and many go to college, in other countries most of the population does not finish high school and only a

minority goes to college. So while in the former case we will observe children too early to appreciate substantial differences in schooling, in the latter case we will observe children late enough to elucidate most of the schooling differences. We assume throughout that we are able to identify those who have fallen behind, irrespective of the average educational attainment of the country in question. In other words, we assume that from our vantage point we will be able to identify those who will finish last, irrespective of the length of the race (e.g., regardless of whether we are observing an 800-meter race or a mile race, we can predict that those who were largely outdistanced after 400 meters will finish last).

As mentioned above, we use sibling correlations of schooling outcomes (as summarized by our leading indicator of socioeconomic failure) to measure intergenerational mobility. The standard correlation coefficient is not appropriate in this context because there are some families with three (or even four) children in the specified age range. Our correlation index is based on the proportion of the variance of schooling outcomes that can be explained by differences between families (as opposed to differences within families): the higher this proportion, the lower the degree of social mobility in the country in question.

Our index of correlation is defined as follows:

$$\rho_g = \frac{\sum_{f=1}^{F} \sum_{s=1}^{S_f} (g_{sf} - \bar{g})^2 \sum_{k=1}^{S_f} (g_{kf} - \bar{g})^2 / S_f}{\sum_{f=1}^{F} \sum_{s=1}^{S_f} (g_{sf} - \bar{g})^2}, \tag{1}$$

where F is the number of families in the sample, S_f is the number of teenage siblings in family f, g_{sf} is the binary indicator of socioeconomic failure of individual s in family f, and $\bar{g}$ is the average indicator in the entire sample. M. Kremer and E. Maskin show that ρ_g corresponds to the R^2 obtained by regressing the schooling gaps on a set of dummy variables for all families in the sample.[6]

It is worth noting that positive values of ρ_g do not necessarily mean that family background has a discernible effect in the variable of interest. Indeed, ρ_g could yield positive values even if family background is inconsequential, as will be the case, for example, when children are assigned to families randomly. To solve this problem, we follow Kremer and Maskin and define an alternative index as follows:

$$\rho_a = 1 - (1 - \rho_g) \frac{S - 1}{S - F}, \tag{2}$$

where S is the number of children in the sample. The new index (ρ_a), which corresponds now to the adjusted R^2 obtained by regressing earnings on family dummies, will yield positive values only if the previous index (ρ_g) is greater than would be expected purely by chance. Positive values of ρ_a can thus be unambiguously interpreted as evidence that family background does play a role in the determination of schooling outcomes.

A word about the interpretation of sibling correlations in general and ρ_a in particular is in order. Sibling correlations summarize all influences common to all children in a given family. These influences include not only parental characteristics but also community characteristics such as school quality and neighborhood norms. Sibling correlations, however, leave out all family influences not shared by siblings. Nonshared influences are potentially important. Psychologists, for example, have long argued that birth order exerts much influence on the frequency and type of interactions between parents and children.[7] Economists, for their part, have argued that parents may treat their children very differently for mere pecuniary reasons.[8]

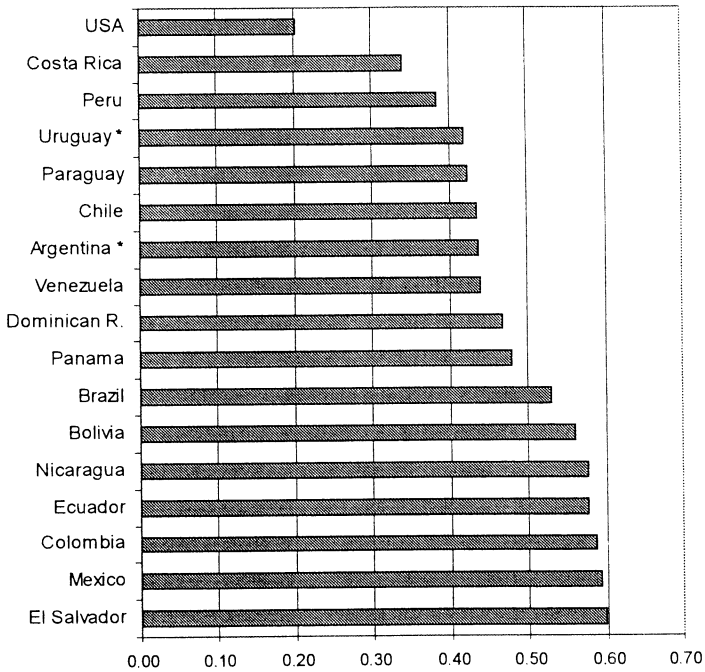
IV. Results

In this section, we compare the degrees of intergenerational mobility for several Latin American countries. We use the correlation index proposed in Section III. Higher values of the index entail lower degrees of intergenerational mobility; or, more precisely, higher values allow a higher fraction of the differences in socioeconomic performance among children to be explained by family background. We present sample sizes and descriptive statistics in table A1.

Figure 2 displays the values of our index for 16 Latin American countries and the United States. Mobility is highest in the United States and Costa Rica and lowest in Colombia, Mexico, and El Salvador. Mobility is also relatively high in Peru and relatively low in Nicaragua and Ecuador. For most Latin American countries, up to 50% of the differences in socioeconomic performance (as measured here) can be accounted for merely by family background.

Figure 3 compares intergenerational mobility and income inequality for the same sample of countries. Most Latin American countries exhibit high inequality of income and low levels of intergenerational mobility (at least in comparison to the United States). The exceptions are Uruguay, which has low inequality and only moderate levels of mobility, and Costa Rica, which has low inequality and relatively high mobility.

How robust are these results to small changes in the methodology? This question is important because our index is based on arbitrary thresholds in the distribution of schooling: we assume that children whose education is above the median education minus 1 year are fine but that those below that threshold are doomed. Needless to say, if the results change



Lower values indicate higher mobility.
* Urban Population only.

FIG. 2.—Index of mobility in the Americas

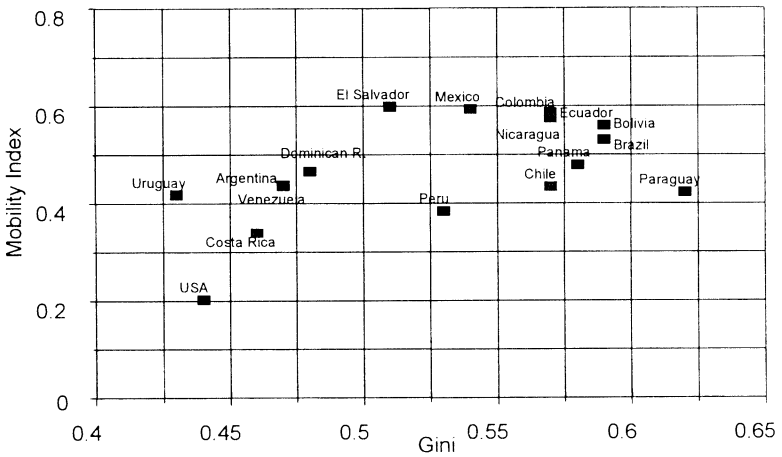


FIG. 3.—Inequality and mobility

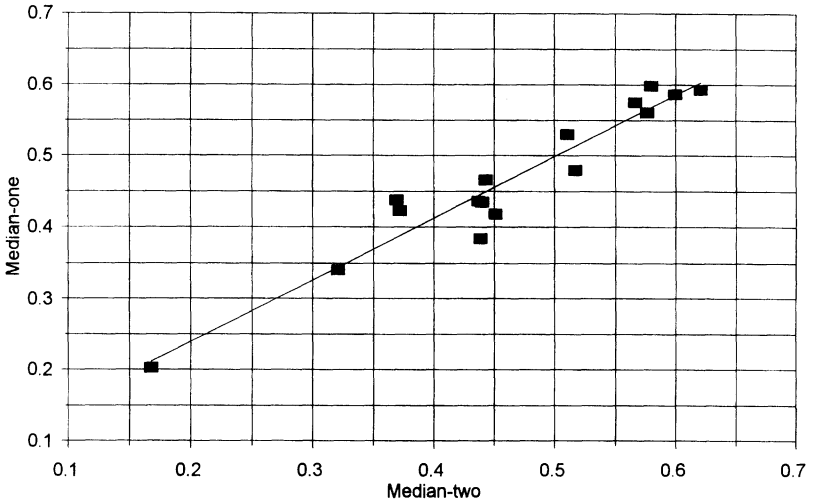


FIG. 4.—Mobility for different thresholds

drastically when we marginally change the thresholds, the credibility of our index will come into question.

Figure 4 shows the association between two indexes that use different thresholds. One uses the median minus 1 year of schooling and the other the median minus 2 years. As shown, the two indexes yield very similar results (the correlation coefficient between the two is greater than 0.96). The ranking of countries is identical at the extremes, but in the middle, where the differences are tiny to begin with, the ranking can change depending on which index is used. Similar results are obtained for other cutoffs, dispelling most doubts about the fragility of our index to small changes in arbitrary definitions.

The previous results make it clear that there are sizable differences in intergenerational mobility within Latin America. This raises the question as to what country-wide variables are associated with these differences. At a basic level, one should expect at least some association between educational attainment and mobility—education, after all, has long been regarded as the foremost instrument of social ascension.

Figure 5 shows the relationship between social mobility and average schooling gaps. Schooling gaps are defined as the difference between the years of schooling that a child would have completed had he or she entered school at age 6 and advanced one grade each year and the child's actual years of schooling. The average gap is computed over all children between 16 and 20 years of age in the country in question. Higher average gaps are, of course, indicative of faulty or insufficient educational systems. There is a positive association between schooling gaps and our correlation index (or, put differently, between country-wide schooling

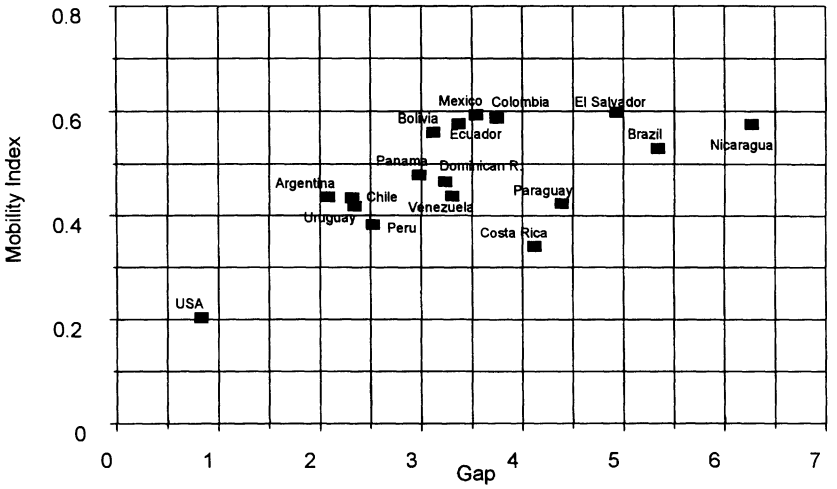


FIG. 5.—Schooling gaps and mobility

averages and intergenerational mobility). The association is linear and strong for most countries. However, Brazil, Nicaragua, El Salvador, and Paraguay exhibit higher degrees of mobility than would be expected given their relative backwardness in terms of education.

Figure 6 shows the association between the coefficient of variation of schooling and our correlation index. A strong positive association between these two variables is apparent, meaning that countries with high

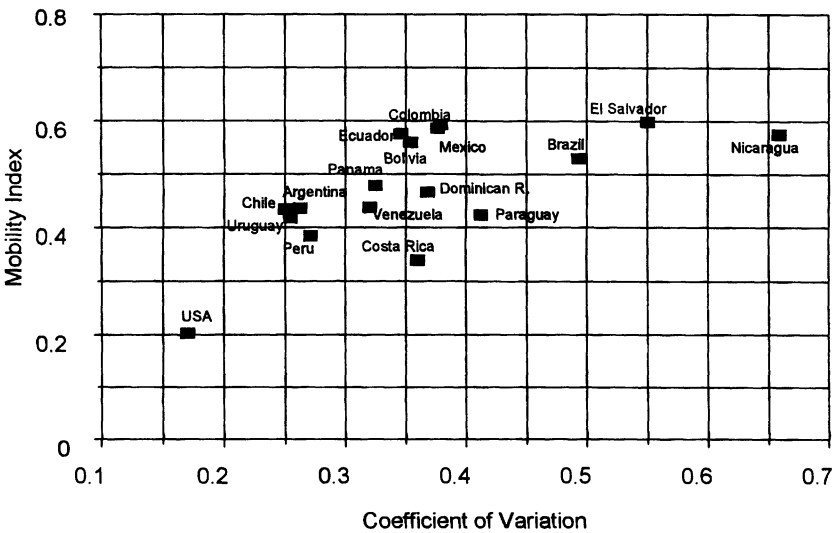


FIG. 6.—Inequality of schooling and mobility

schooling inequality also tend to be less mobile. Given the previously shown association between inequality of schooling and average schooling, figure 6 just reiterates a point already made; namely, social mobility increases as education becomes the right of many, not just the privilege of few.

Figure 7 shows the association between social mobility and public expenditures on education as a percentage of GDP (the expenditure data were taken from the World Bank *World Development Indicators*).[9] There is no clear relationship between these two variables, which is hardly surprising given the tenuous association between current public spending on education and overall education levels. Thus, spending more money on education may not be the most expeditious way to equalize opportunities. Money is, of course, part of the equation but may be rather ineffectual in the presence of widespread waste and corruption and in the absence of appropriate institutions.

Figure 8 shows the association between social mobility and per capita GDP. In Latin America, the levels of development and social mobility are only tenuously associated. As shown, mobility is not substantially higher in the most-developed countries of the region: it is slightly above average in the southern countries and Venezuela and very low in Mexico. This result flies in the face of some recent theoretical studies that posit that intergenerational mobility should grow steadily as countries become more developed.[10]

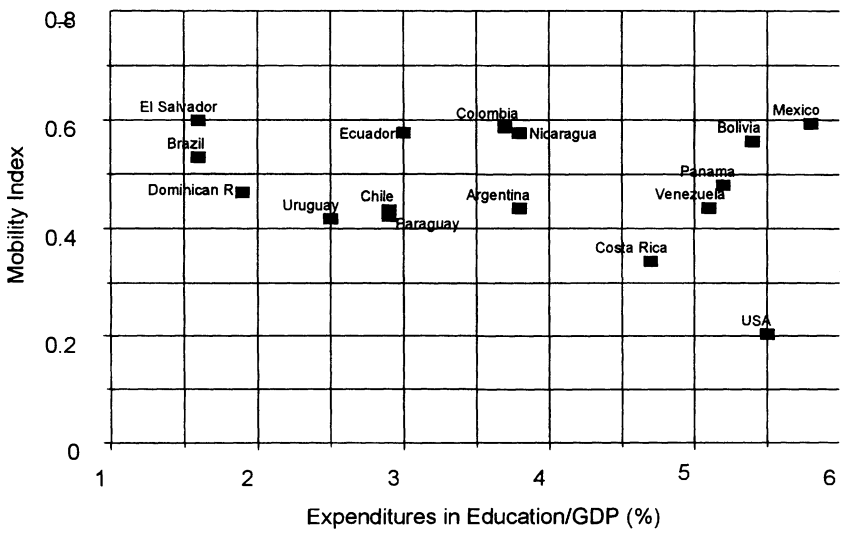


FIG. 7.—Spending on education and mobility

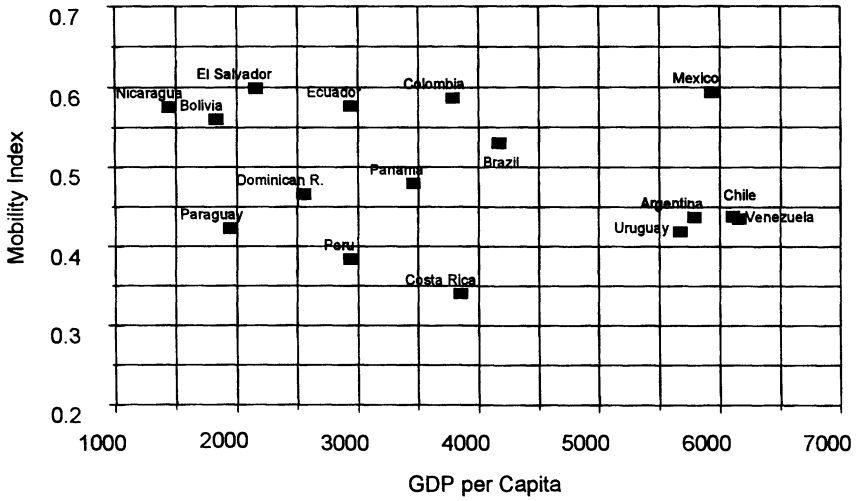


FIG. 8.—GDP per capita and mobility

V. Assortative Mating and Mobility

Marriage markets and intergenerational mobility are connected through various channels. For one thing, marriage offers a quick way to overcome inherited misfortunes—or to consume inherited fortunes, for that matter. For another, low rates of assortative mating can increase mobility by spreading the educated population across more households.[11] In sum, marriage markets can, at least to some extent, reshuffle the fortunes we are dealt at the moment of birth.

Table A2 shows the correlation coefficient of spouses' schooling for 16 Latin American countries and the United States. Two different coefficients are shown. The first corresponds to all couples in the sample and the second only to couples whose head of household is younger than 40 years. Two remarks should be made. First, assortative mating varies much less across countries than intergenerational mobility: the ratio between the two polar countries is 1.3 in the former case and 3.7 in the latter case. Second, sorting by education in marriage markets has declined in Latin America, at least in light of the differences between young and old couples implied by the differences between columns 2 and 3 of table A2.

Figure 9 shows the correlation between assortative mating and mobility, and figure 10 shows the correlation between assortative mating and inequality. While the connection between the first two variables is noticeable but not overwhelming (the correlation coefficient is 0.60), the connection between the last two variables is very high (the correlation coefficient is 0.81). Thus, sorting by education in marriage markets

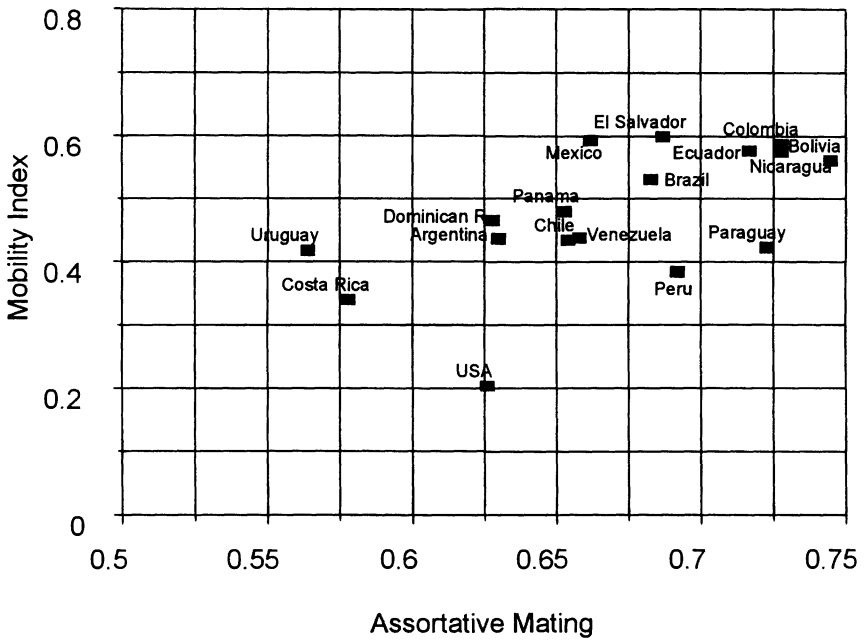


FIG. 9.—Mobility and assortative mating

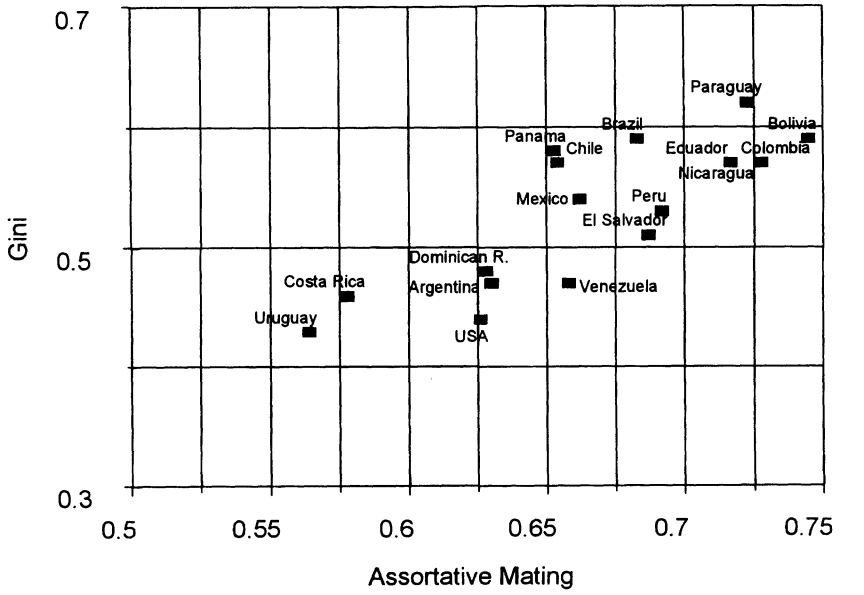


FIG. 10.—Inequality and assortative mating

seems to increase sharply with inequality, which suggests either that more unequal societies will tend to be more stratified (perhaps because of the presence of spatial segregation and discrimination) or, alternatively, that more stratified societies will tend to accentuate inequalities (perhaps because of the presence of spatial externalities in the transmission of human capital between generations).[12]

VI. Conclusions

We argue in this article that by comparing sibling correlations of schooling, we can learn about the differences in the degrees of social mobility among countries (e.g., we can learn about the extent to which family background determines socioeconomic success in different countries). Our analysis is limited for obvious reasons. First, schooling is an imperfect measure of child outcomes. School quality, for example, is conspicuously absent from our analysis, as are differences in parental investments. Second, schooling does not capture all possible channels through which family background affects socioeconomic success. Family connections, for example, can make all the difference when children enter the labor force. Parental wealth also can make a big difference later in life. Both factors, however, have been left out of our analysis.

The above-mentioned problems notwithstanding, we believe that, especially for developing countries, schooling provides an early glimpse of what is to come, and hence it can be used to gauge differences in social mobility. Our results are noncontroversial in that they reiterate a piece of conventional wisdom: education is perhaps the most expeditious way to enhance equality of opportunity. We find, in particular, that access to education (measured, e.g., by average schooling gaps) is a powerful predictor of the importance of family background in socioeconomic performance. We also find that in Latin America, social mobility is only loosely related to income per capita and inequality is strongly associated with sorting in marriage markets.

Of course, additional research is needed to answer the main questions that this article raises: Who gets ahead in Latin America? What does family have to do with it? Although the absence of panel data remains an important hurdle in answering these questions, there is much that can be done. In some countries, for example, some household surveys have regularly included information on parental schooling and occupational status, and this information can be used to shed some light on these and related matters (Colombia, Peru, Mexico, and Brazil are cases in point). Similarly, the 1998 version of *Latinobarometer,* a public opinion survey for Latin America, contains data on parental schooling for 17 Latin American countries that can also prove to be very useful. Obviously, only by combining these different data will we be able to get a clear view of the still blurred picture of intergenerational relations in Latin America.

Appendix

TABLE A1

SIBLING CORRELATIONS AND SCHOOLING OUTCOMES

Country	Year	ρ_a	Average Number of Children per Family	Number of Families	Gap (Years of Schooling)	Average (Years of Schooling)	Inequality of Schooling
Argentina*	1996	.437	2.18	2,098	2.1	10.0	.26
Bolivia	1997	.561	2.14	647	3.1	8.6	.35
Brazil	1996	.531	2.20	5,906	5.3	6.4	.49
Chile	1996	.435	2.12	1,801	2.3	9.6	.25
Colombia	1997	.587	2.18	2,426	3.7	8.1	.38
Costa Rica	1995	.340	2.18	679	4.1	7.7	.36
Dominican Republic	1996	.466	2.19	439	3.2	8.7	.37
Ecuador	1995	.577	2.19	506	3.4	8.4	.35
Mexico	1996	.594	2.21	1,352	3.5	8.4	.38
Nicaragua	1993	.576	2.23	442	6.3	5.5	.66
Panama	1997	.480	2.18	565	3.0	8.9	.32
Peru	1997	.385	2.17	377	2.6	9.3	.271
Paraguay	1995	.423	2.13	279	4.4	7.4	.41
El Salvador	1995	.599	2.17	791	4.9	6.9	.55
Uruguay*	1995	.418	2.15	863	2.3	9.7	.25
Venezuela	1995	.438	2.20	1,737	3.3	8.6	.32
Average		.490	2.18	1,307	3.6	8.3	.37
United States	1996	.203	2.10	1,214	.8	11.0	.17

NOTE.—Children between 16 and 20 years of age were used in the computations. Inequality is measured by the coefficient of variation.
* Urban population only.

TABLE A2

ASSORTATIVE MATING IN LATIN AMERICA

	ALL AGES		AGE < 40	
COUNTRY	ρ	*N*	ρ	*N*
Argentina	.644	19,402	.630	7,933
Bolivia	.791	5,767	.745	2,596
Brazil	.720	60,994	.683	29,086
Chile	.741	24,269	.654	10,427
Colombia	.755	22,423	.728	10,170
Costa Rica	.658	7,016	.578	3,534
Dominican Republic	.698	3,674	.628	1,602
Ecuador	.758	4,247	.717	2,040
El Salvador	.717	5,527	.687	2,520
Mexico	.732	10,653	.662	5,366
Nicaragua	.732	3,076	.728	1,714
Panama	.723	6,450	.653	2,791
Paraguay	.735	3,388	.723	1,597
Peru	.740	12,329	.692	5,498
Uruguay	.631	13,150	.564	3,887
Venezuela	.703	12,491	.626	5,412
Average	.717	13,429	.668	6,011
United States	.648	26,942	.658	10,002

NOTE.—*N* = Number of observations.

Notes

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