Cross-Country Differences in Intergenerational Earnings Mobility

Gary Solon

I
nternational studies of the extent to which economic status is passed from one generation to the next are important for at least two reasons. First, each study of a particular country characterizes an important feature of that country's income inequality. Second, comparisons of intergenerational mobility across countries may yield valuable clues about *how* income status is transmitted across generations and *why* the strength of that intergenerational transmission varies across countries. The first section of this paper explains a benchmark measure of intergenerational mobility commonly used in U.S. studies. The second section summarizes comparable empirical findings that have accumulated so far for countries other than the United States. The third section sketches a theoretical framework for interpreting cross-country differences in intergenerational mobility.

A Benchmark Measure of Intergenerational Mobility

Most of the recent U.S. evidence on intergenerational income mobility has come from two surveys, the Panel Study of Income Dynamics (PSID) and the National Longitudinal Surveys (NLS) of labor market experience. The majority of this U.S. literature has focused on the connection between son's and father's earnings, but the study by Chadwick and Solon (2002) is a recent example of intergenerational research that encompasses daughters as well as sons and considers family income as well as individual earnings.

The most common approach has been to estimate the intergenerational earnings elasticity (henceforth denoted as β) by applying least squares to the

■ *Gary Solon is Professor of Economics, University of Michigan, Ann Arbor, Michigan. His e-mail address is* ⟨*gsolon@umich.edu*⟩*.*

regression of a logarithmic measure of son's earnings on a logarithmic measure of father's earnings, with controls for both son's and father's age. The elasticity β provides an answer to questions like, if the father's earnings are 50 percent above the average in his generation, what percentage above the average should we predict the son's earnings will be in his own generation? In addition, if the variances in the logarithmic earnings variables are about the same in the son's and father's generations, β also will approximately equal the correlation between the log earnings variables for the two generations.

The U.S. literature has highlighted some crucial issues in the measurement of earnings for both fathers and sons. For fathers, a key challenge is to derive an accurate measure of long-run earnings. Although the intergenerational association in long-run earnings is of main interest, data limitations forced some early studies of intergenerational mobility to rely on single-year measures of father's earnings. Because of both response error and genuine transitory fluctuations in earnings, single-year measures are error-ridden proxies for longer-run earnings. As explained in every introductory econometrics textbook, this sort of errors-in-variables problem in a regression equation's explanatory variable tends to dilute the estimated coefficient of that variable. Therefore, to reduce the resulting tendency to underestimate the intergenerational earnings elasticity, most recent U.S. studies have used the longitudinal structure of the PSID and NLS to create multiyear measures of father's earnings.

A different problem has surfaced in measuring son's earnings. Numerous researchers of intergenerational mobility have reported that they estimate relatively small intergenerational elasticities if they measure son's earnings near the very beginning of his career, but that their estimates get larger as son's earnings are measured further along in the life cycle. This pattern arises because the measurement error in son's early earnings as a proxy for his long-run earnings is not of the classical textbook variety. If, among sons in their twenties, the ones destined for higher long-run earnings are about to experience more rapid earnings growth than the ones destined for lower long-run earnings, the measurement error in early earnings as a proxy for long-run earnings is "mean reverting," that is, it is negatively correlated with long-run earnings. As explained by Bound et al. (1994), mean-reverting measurement error in a regression's dependent variable compresses its variation and consequently leads to a tendency to underestimate the magnitude of the regression's slope coefficient. Within the intergenerational mobility literature, this phenomenon has been explored most thoroughly by Reville (1995), who uses the PSID to estimate regressions of five-year averages of son's log earnings on five-year averages of father's log earnings. When the sons' averages are taken over years when the sons were still in their 20s, Reville's estimates of the intergenerational elasticity are around 0.25. When instead the sons' earnings are averaged over years when the sons were well into their 30s, the elasticity estimates start approaching 0.5. Because of this issue, some of the same researchers who have used multiyear measures of father's earnings have chosen to measure son's earnings in only the latest available year. Averaging son's earnings over multiple years some-

times would require averaging in observations from too early in his career and therefore would worsen the downward bias in the estimation of the intergenerational elasticity in long-run earnings.

The now-large U.S. literature is reviewed in detail in Solon (1999). A short summary is that most of the U.S. studies that have used multiyear measures of father's earnings and have measured son's earnings after his first few years in the labor market have estimated β at about 0.4 or higher.

International Evidence

Table 1 summarizes the evidence on intergenerational mobility in Canada, Finland, Germany, Malaysia, South Africa, Sweden and the United Kingdom. For comparability with most of the U.S. literature, the table focuses on estimates of the elasticity of son's earnings with respect to father's earnings. In most of the studies, the estimated elasticity comes from least squares estimation of a log-linear regression of son's earnings on father's earnings with age controls for both generations. With an eye to the measurement issues discussed above, the table lists not only the data source and the estimated intergenerational elasticity $\hat{\beta}$ for each study, but also the study's measures of son's and father's earnings and the age range of the sons in the sample.

Whenever possible, the authors of the listed studies used multiyear measures of father's earnings, but in some cases data limitations forced the authors to settle for a short-run measure. In other cases, the data set with information on son's earnings did not include the father's earnings, but only other measures of his socioeconomic status, such as his education, occupation or social class. In such cases, the researchers used a separate data set on the parental generation to estimate a first-stage regression of father's log earnings on his education, occupation and/or social class. Then, in a second stage, they estimated the regression of the son's log earnings on a prediction of his father's log earnings based on the first-stage regression. While using a single-year measure as a proxy for longer-run earnings is likely to induce a substantial downward errors-in-variables bias, the two-stage procedure that uses education, occupation or social class to predict father's earnings is likely to lead to an upward bias. The problem is that the father's education, occupation and social class are not only correlated with the father's earnings, but also might be positive predictors of son's earnings even after conditioning on father's long-run earnings. In the second-stage regression, when father's education, occupation or social class is used only to predict father's earnings, but not as a separate explanatory variable in its own right, the resulting omitted-variables bias may lead to overestimation of the intergenerational earnings elasticity. The appendix to Solon (1992) gives a formal analysis of this problem.

Once one recognizes the importance of such measurement issues, one also realizes how tricky it is to compare estimates for different countries from different studies. Do the differences among estimates appear because of actual cross-country

Table 1

Estimates of Intergenerational Earnings Elasticities in Countries Other than the United States

Study	Sample	Earnings Measure and Age Range for Sons	Father's Earnings Measure	$\hat{\beta}$
Atkinson, Maynard and Trinder (1983)	Fathers in working-class neighborhoods of York, England, in 1950 and their sons	Log hourly earnings at survey date (1975–78)[a]	Log weekly earnings in 1950	0.42
Björklund and Jäntti (1997)	Swedish Level of Living Surveys	Log annual earnings in 1990; ages 29–38	Prediction of log annual earnings based on education and occupation	0.28
Corak and Heisz (1999)	Canadian income tax records	Log annual earnings in 1995; ages 29–32	Log of five-year average of annual earnings	0.23
Couch and Dunn (1997)	German Socio-Economic Panel	Log of multiyear (up to six-year) average of annual earnings[b]	Log of multiyear (up to six-year) average of annual earnings	0.11
Dearden, Machin and Reed (1997)	British National Child Development Survey	Log weekly earnings in 1991; age 33	Prediction of log weekly earnings based on education and social class	0.57
Gustafsson (1994)	Fathers in Stockholm, Sweden, in 1955 and their sons born in 1939–46	Four-year average of log individual income; ages 31–41	Log individual income in 1955	0.14
Hertz (2001)	Co-residing fathers and sons in two South African surveys	Monthly earnings in 1993 or 1998; ages 16–39	Monthly earnings in 1993 or 1998	0.44[c]
Jäntti and Osterbacka (1996)	Finnish censuses	Log annual earnings in 1990; ages 30–40	Log of two-year average of annual earnings	0.22
Lillard and Kilburn (1995)	Malaysian Family Life Surveys	Log annual earnings in 1988[d]	Log annual earnings in 1976–77	0.26
Osterbacka (2001)	Finnish censuses	Log of three-year average of annual earnings; ages 25–45	Log of two-year average of annual earnings	0.13
Osterberg (2000)	Swedish income tax records	Three-year average of log annual earnings; ages 25–51	Three-year average of log annual earnings	0.13
Wiegand (1997)	German Socio-Economic Panel	Log monthly earnings in 1994; ages 27–33	Five-year average of log monthly earnings	0.34

[a] Atkinson, Maynard, and Trinder do not report an age range for their regression sample, but their Table 4.4 for a broader sample shows a range from under 25 to over 65.

[b] Couch and Dunn report a sample mean age of 22.8 in 1984, the second of the six years in which they observe earnings.

[c] This elasticity estimate comes from multiplying Hertz's 0.145 coefficient estimate for the intergenerational regression of earnings levels by a 3.0 ratio of fathers' sample mean earnings to sons' sample mean earnings.

[d] Lillard and Kilburn require their sons to be over 18, and they report a sample mean age of 25.

differences in intergenerational mobility or because of differences across studies in their earnings measures, age ranges or other sample selection criteria?

It therefore is very helpful when a study of another country facilitates international comparisons by performing a parallel analysis for the United States. For example, Couch and Dunn's (1997) $\hat{\beta}$ of 0.11 for Germany seems strikingly lower than most U.S. estimates, but their parallel estimate based on the PSID is only 0.13. Both of these small estimates probably are driven by Couch and Dunn's unusually young samples. Indeed, using data from more recent waves of the same German longitudinal survey, Wiegand (1997) obtains much larger intergenerational elasticity estimates by observing the sons at more mature ages.

Similarly, Björklund and Jäntti (1997) supplement their analysis of Swedish fathers and sons with a companion analysis of the PSID. Because their Swedish data set with sons' earnings includes fathers' education and occupation, but not fathers' earnings, Björklund and Jäntti's Swedish analysis has to resort to the sort of two-stage estimation described above. Recognizing that the resulting $\hat{\beta} = 0.28$ may be upward biased, Björklund and Jäntti perform the same two-stage estimation with the PSID. Their resulting two-stage estimate for the United States is 0.52, higher than both their corresponding Swedish estimate and their PSID estimate of 0.39 based on the direct regression of son's log earnings on a multiyear measure of father's log earnings. Since the two-stage estimate for Sweden is smaller than both the direct and two-stage estimates from the PSID, Björklund and Jäntti conjecture that intergenerational transmission of earnings is weaker in Sweden than in the United States. That conjecture is consistent with the results from the two other Swedish studies reported in Table 1. Using intergenerational data from Swedish income tax records, Osterberg (2000) obtains a $\hat{\beta}$ of only 0.13. Gustafsson (1994) acknowledges that his $\hat{\beta}$ of 0.14 is biased downward by his reliance on a single-year measure of father's income, but even a generous upward correction for measurement error still produces an estimate considerably lower than most U.S. estimates. Similarly, the studies by Corak and Heisz (1999), Jäntti and Osterbacka (1996) and Osterbacka (2001) strongly suggest that Canada and Finland, like Sweden, are more mobile societies than is the United States.

In contrast, the intergenerational elasticity estimates for the United Kingdom are quite high. Atkinson, Maynard and Trinder (1983) estimate a 0.42 intergenerational elasticity even though their estimate is biased downward by reliance on a short-run measure of father's earnings. Dearden, Machin and Reed (1997) report an even higher $\hat{\beta}$ of 0.57, but their estimate may be biased upward by their prediction of father's earnings on the basis of his education and social class.

It is sometimes conjectured that intergenerational transmission of economic status is particularly strong in less developed countries, but the paucity of intergenerational income data in less developed countries has made it difficult to corroborate that conjecture. Table 1 contains only two studies of less developed countries, Lillard and Kilburn's (1995) study of Malaysia and Hertz's (2001) study of South Africa. The latter study is limited to contemporaneous earnings reports by a sample of fathers and sons who lived together and hence may display a different

intergenerational earnings association than would a more representative sample. Despite reliance on short-run earnings measures for fathers and young samples of sons, both studies report substantial intergenerational elasticity estimates. The results therefore are consistent with the conjecture of strong intergenerational transmission in less developed countries, but firm conclusions should await the arrival of more extensive evidence.

At this stage, it seems reasonable to conclude that the United States and the United Kingdom appear to be less mobile societies than are Canada, Finland and Sweden. A pertinent question is whether this contrast in intergenerational mobility is connected with other cross-country differences in income inequality. Björklund and Jäntti (1997), for example, stress that Sweden displays less cross-sectional earnings inequality than does the United States, as well as weaker intergenerational transmission. Is there a broader connection between the cross-sectional inequality within a generation and the intergenerational transmission of inequality? The cross-country comparisons of earnings inequality in Gottschalk and Smeeding (1997), Freeman and Katz (1995) and Aaberge et al. (2002) do indicate greater cross-sectional inequality in the United States and the United Kingdom than in Sweden and Finland. The mapping between cross-sectional inequality and inter-generational transmission, however, seems less than exact. Despite the considerable intergenerational mobility that Corak and Heisz (1999) estimate for Canada, Canada also scores relatively high on measures of cross-sectional inequality. In the next section, I will outline a theoretical framework with which to interpret these cross-country differences in both intergenerational mobility and cross-sectional inequality.

A Theoretical Perspective

In Solon (forthcoming), I modify Becker and Tomes's (1979) theoretical model of intergenerational mobility in a way that rationalizes the log-linear inter-generational regression commonly estimated by empirical researchers. The model assumes that parents divide their income between their own consumption and investment in their children's human capital so as to maximize a utility function in which the two goods are parental consumption and child's later income. In addition to allowing for discretionary decisions about human capital investment, the model also encompasses more mechanical aspects of intergenerational trans-mission of earnings generating endowments. In Becker and Tomes's words, "Chil-dren are assumed to receive endowments of capital that are determined by the reputation and 'connections' of their families, the contribution to the ability, race, and other characteristics of children from the genetic constitutions of their fami-lies, and the learning, skills, goals, and other 'family commodities' acquired through belonging to a particular family culture."

The model can be used to characterize both intergenerational mobility and cross-sectional inequality in the steady state and also to examine implications of

departures from the steady state (such as an increase in the earnings return to human capital). It turns out that the steady-state intergenerational earnings elasticity depends positively on both the strength of the mechanical heritability of income-generating traits and the earnings return to human capital investment, and it varies inversely with the progressivity of government investment in children's human capital (for example, through public provision of education or health care). Thus, if country *A* has a higher steady-state intergenerational elasticity than country *B,* this could be because country *A* has stronger heritability (for example, because of a greater degree of assortative mating), higher earnings returns to human capital investment or less progressive public investment in children's human capital. Previous authors have sometimes suggested one or another of these factors as a determinant of cross-country differences in intergenerational mobility. Corak and Heisz (1999), for example, speculate that Canada exhibits more intergenerational mobility than does the United States because of Canada's more progressive public policies.

In addition to formalizing the roles of heritability, human capital investment and public policy in intergenerational mobility, the model also can be used to illuminate the connections between intergenerational mobility and cross-sectional inequality. Like the intergenerational elasticity, the cross-sectional variance of log earnings in the model's steady state depends positively on mechanical heritability and the earnings return to human capital investment, and it depends negatively on the progressivity of public investment in children's human capital. The model therefore supports Björklund and Jäntti's (1997) conjecture that the contrasts between Sweden and the United States in both inequality and intergenerational mobility may be related. But the model shows that cross-sectional inequality also depends positively on the variance of the innovations to the process for heritability of endowments, even though that variance does not influence the elasticity or correlation between generations. Thus, in accordance with the discussion at the end of the previous section, there is not an exact mapping between intergenerational mobility and cross-sectional inequality. One reason that two societies with approximately the same intergenerational elasticity might differ in cross-sectional inequality is that they differ in the heterogeneity of their ability or other endowments.

Clearly, a highly stylized model like this one should not be taken too literally. For that matter, the empirical evidence summarized in the previous section is quite fragmentary. Nevertheless, the rapidly growing international evidence on intergenerational mobility and its connections with relevant theories hold out the promise that continuing research will improve our understanding of why the intergenerational transmission of economic status is strong in some countries and weak in others.

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