

CHAPTER 21

INTRAGENERATIONAL INEQUALITY AND INTERTEMPORAL MOBILITY

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1. INTRODUCTION

THE level of average income (as well as wages, wealth, and consumption), its distribution at a given time (income inequality), and how they change over time are among the important indicators used to evaluate and compare the quality of life in modern societies.² Previous chapters have explored how inequality changes

¹ Lisa M. Dragoset, Gary S. Fields, and Joachim R. Frick as well as the authors and editors of this volume provided useful feedback on preliminary versions of this chapter. We thank them for their comments and Jessica O'Day for excellent editorial assistance with the manuscript.

² Income is only one measure of economic well-being but is the most common used in the intragenerational mobility literature. Thus, we primarily focus our discussion on it. The methods developed to measure intragenerational income mobility are also applicable to wages, wealth, consumption, etc.

over time using repeated cross-sectional measures for different countries. Here, we discuss the literature which uses panel data to measure the income patterns of individuals over their lifetimes, that is, intragenerational mobility.

Some market-oriented societies like the United States are seen as accepting higher levels of cross-section inequality, not only to achieve more rapid economic growth over time, but also to allow greater mobility, and thus to have less permanent inequality, than societies more willing to restrict competitive forces. A major achievement of the modern intragenerational mobility literature has been to precisely define mobility so that it can be empirically measured for various purposes. One of the first uses of these mobility measures was to determine whether a tradeoff exists between increased cross-sectional inequality (permanent and transitory inequality) and mobility (less permanent inequality) across countries. More recently a new measure has been developed that takes into consideration the role of economic expansions and recessions. It can be decomposed into the portion of mobility due to income growth versus changes in individual positions. Others have sought simply to measure the extent of permanent inequality within the distribution of income. All of these measures are useful in cross-national comparisons of different societal rules.

But the intragenerational mobility literature has also looked at individuals within societies to determine the degree that their initial place in the income distribution influences mobility. These studies have been motivated by an interest in whether those at the top and bottom of society are differentially mobile but also by an interest in the degree to which spells in poverty impact future movement up the income distribution.³

Finally, a parallel literature, primarily focusing on changes in labor earnings, has attempted to identify the extent of permanent and transitory variance in individual labor earnings as a way of considering the consequences of social institutions on the volatility of wages over time. A variation of this literature in the United States has attempted to determine whether large downward income fluctuations have increased among American households and if so, whether reduced government and private sector insurance protection is the cause.

We begin this chapter with a detailed explanation of the most common methods used to calculate intragenerational mobility and the empirical problems of doing so across countries using panel data. Although other chapters have avoided technical detail by referring to the discussion of cross-sectional measures of inequality contained in Chapter 3, it is necessary for us to review some of this detail in our discussion of the link between single and multi-period measures of inequality. In doing so, we describe the relationship between the data used in studies of mobility

³ Erikson and Nolan (2006) provide an excellent discussion of the relationship of income mobility to persistent poverty. Whether there is a poverty trap in Britain is discussed in Dickens (2000) and Gardiner and Hills (1999).

and the conceptual content of the research; major findings in the literature, and, finally, what remains to be learned.

2. BASIC MEASURES

Intragenerational mobility refers to observed differences in the economic circumstances of individuals over time. The mobility we examine is within a generation since the research observes specific people over time who, when aggregated, loosely form a generation. We do not consider the role parents play in determining their children's subsequent position in the income distribution, leaving that to the intergenerational mobility Chapter 20. We begin by reviewing the properties of cross-sectional income inequality measures because the earliest measures of intragenerational mobility developed from them.

Cross-Sectional Inequality

The most widely used measure of intragenerational mobility (Shorrocks R) incorporates standard classes of inequality indices as an element in its calculation. Thus, to fully understand the intragenerational mobility literature it is important to know the properties of these cross-sectional income inequality measures. Because these measures are discussed in Chapter 3, we focus on how they relate to the intragenerational mobility literature.

Theil (1967) provides an early method of calculating income inequality that satisfies desirable formal properties while retaining intuitive interpretations—the general entropy class of indices. Entropy is the loss of information in the transmission of a signal. Theil (1967) considers the issue of how strong a signal population shares provide in describing the observed distribution of well-being. If the distribution of well-being is unequal relative to population weights, there is entropy in the system.

Theil (1967) is important because he considers whether methods of measuring inequality satisfy basic useful properties applied analysts agree should be met. The underlying properties of those indices are more fully explored in Shorrocks (1980).⁴ The developments of inequality indices by Shorrocks (1980) and Theil (1967) are similar to the axiomatic approach used in microeconomic theory to develop utility functions. Shorrocks (1980) first states formal properties (axioms) desirable in an

⁴ Shorrocks places a stronger set of restrictions on potential measures than Theil.

inequality measure. He then proves Theil (1967) indices can be derived from the equations representing those axioms.⁵

Shorrocks (1980) argues four properties are desirable for a cross-sectional inequality measure. The first is *symmetry*. In measuring inequality for some income level, equal absolute deviations from above or below should make the same contribution to the sum of inequality.

To ease interpretation, it is also useful to construct inequality measures that have a reference value for no inequality; this norms the index relative to that limiting value. To norm an index means to give an interpretation to its maximum or minimum, so that other values can be interpreted relative to it. A value of zero, or no inequality, is usually associated with distributions where every individual income is equal to the mean. So, the measure has a *norm of zero*.

Third, if the measure is going to be useful, it needs to be calculable across all valid levels of income. So, the measure is assumed to be characterized by *continuity*. That is, it is everywhere calculable and does not increase or decrease in discontinuous jumps.

Finally, it would be helpful if an aggregate measure is decomposable into the amount coming from each separate group as well as cross-group components.⁶ Decomposability is a useful feature of an inequality measure. For instance, a country's overall inequality can be disaggregated into components within demographic groups and across them (Károly and Burtless, 1995). Likewise total world inequality can be disaggregated within and across nations (Berry *et al.*, 1983; Bourguignon and Morrisson, 2002). Shorrocks (1980) assumes that the class of indices to be considered is *additively decomposable*.

He then proves that the only index that satisfies these four properties is:

$$I(y; n) = \frac{1}{\theta(\mu, n)} \sum_i [\phi(y_i) - \phi(\mu)]. \quad (1)$$

The inequality index, I , is a function of the relevant measure of well-being and the number of individuals. The index includes a proportional weight, $1/\theta$, where θ is also a function of the mean of the measure of well-being and the sample size. The weight is multiplied by the sum of a weighted measure of individual levels of well-being less the mean, μ .

In addition to the above axioms, the cross-sectional inequality literature argues that additional properties should be satisfied. One is the Pigou-Dalton principle

⁵ Similar approaches can be found in the work of Bourguignon (1979) and Cowell (1985). Cowell (1985) uses an axiomatic approach to develop a set of Kolm indices which subsume the Theil and Atkinson indices as special cases. Bourguignon (1979) considers a similar set of conditions to those found in Shorrocks (1978a) and draws a similar conclusion.

⁶ Bourguignon (1979), Cowell (1980), and Shorrocks (1980, 1982, and 1984) each consider decomposable inequality indices in addition to Theil (1967). Theil (1967) shows that the Gini is not mathematically decomposable.

of transfers which states that when income goes from someone above to someone below average well-being while preserving the mean, it should reduce inequality. Shorrocks (1980) shows that equation (1) satisfies this property. A second is that the measure should not vary if all values in a given population are replicated and combined with the original distribution so that the count of its members is doubled. Indices described by equation (1) will satisfy this condition as long as the weights used in calculating the index take a specific form. A third is mean independence. If two distributions have the same variability of income but a different level, the measures of their inequality should be equal.

Shorrocks (1980) shows that only inequality indices that take the form below can simultaneously satisfy all of these properties:

Au: Deleted closing parens in denominator. Is it OK.

$$I(y; n) = \frac{A_n}{c(c-1)} \sum_i \left[\left(\frac{y_i}{\mu} \right)^c - 1 \right] \quad \text{when } c \neq 0, 1$$

$$I(y; n) = \frac{1}{n} \sum_i \log \left(\frac{\mu}{y_i} \right) \quad \text{when } c = 0, \text{ and}$$

$$I(y; n) = \frac{1}{n} \sum_i \frac{y_i}{\mu} \log \left(\frac{\mu}{y_i} \right) \quad \text{when } c = 1. \quad (2)$$

This equation is a one parameter index because the value of c determines the analytical form used to calculate the inequality indices and is identical to the one developed by Theil (1967). The Theil indices are abbreviated as $I_c(y)$ where $I_0(y)$ refers to the form shown above when $c = 0$. This measure is the average difference (in logs) between individual measures of well-being and the average in the sample. It's the average (geometric) proportional difference between each person's measure relative to the sample average. $I_1(y)$ is the same geometric mean difference weighted by the proportional difference in the income received by each individual relative to the average.

Because the weighting across observations changes with the value of c , different versions of the Theil indices emphasize different parts of the distribution.⁷ Because the upper range of most survey measures of well-being include a few very large values, weighting each observation equally places more emphasis on lower values since they represent a greater share of the population. Hence the $I_1(y)$ measure places a greater emphasis on higher values because it weights the contribution of each person based on the income received relative to the average.

Even though the Gini index does not satisfy the condition of decomposability, it is often used in inequality research. We present its formula taken from Theil

⁷ Foster and Shorrocks (1987) provides a useful discussion of this issue. The Atkinson Index (Atkinson, 1975) requires that a researcher explicitly set a parameter which determines the weights placed on different parts of the distribution.

(1967: 121) in equation (3) since it is often imbedded within measures of mobility.

$$G^* = \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n x_i x_j \left| \frac{y_i}{x_i} - \frac{y_j}{x_j} \right| \quad (3)$$

where x is the population share of the group indexed while y is the income share of the group. The Gini is one-half of a weighted average of all absolute differences between the deflated per capita incomes, the weights being the products of the corresponding population shares.

Decomposability and Intragenerational Mobility

Measures using individual data

Theil (1967) shows the usefulness of the decomposability property of entropy indexes in the cross-sectional literature by using them to calculate within and between inequality values by race, across states, and nations. Shorrocks (1982, 1984) does so for income and demographic subgroups. Bourguignon (1979) and Cowell (1980) independently provide alternative analytical approaches to deriving decomposable indices discussed above. But most importantly for our purposes, Shorrocks (1978a) recognized the potential of applying decomposable indices in the dimension of time.

Shorrocks (1978a) poses his concept of intragenerational mobility as a comparison between a static or one-period measure of inequality and a dynamic one. High frequency events such as monthly earnings are less volatile if aggregated over a year. Hence in moving from a one-period measure at any time to a longer sampling frame, those observed in the worst position initially should be in an improved position later and vice versa. Thus, Shorrocks argued that multi-period measures of inequality provide a contrast between static positions and movement over time and hence are measures of mobility. 'In essence, mobility is measured by the extent to which the income distribution is equalized as the accounting period is extended' (Shorrocks, 1978a: 378).

His formal analysis focuses primarily on indices taking the form:

$$I[Y] = g\left(\frac{Y}{\mu}\right) \quad (4)$$

where g is a strictly convex function. This includes the Theil (1967) inequality indices as well as those developed in Atkinson (1970, 1975). By the definition of convexity, if a measure of inequality is calculated using multiple periods of data, it must be less than or equal to the measures for individual years.

Shorrocks (1978a) benchmarks his analysis to the state where relative incomes never change, to get a measure which takes complete immobility (or perfect

rigidity) as its limiting value. In this conceptual model, equalization of incomes over time requires variation or mobility over time. So, societies with more variability in incomes should also be more equalizing in the long run.

He proposes a measure of rigidity, R , with an upper limiting value of 1. The computational formula for the Shorrocks R is:

$$R = \frac{I[Y]}{\sum_{k=1}^m w_k I[Y^k]} \quad (5)$$

where $w_k = \mu_k/\mu$; m refers to the number of periods over which the measure is computed. The numerator of R is the measure of inequality over all periods of the sample while the denominator is calculated as the sum over individual years. The weights in the denominator are the shares of income received in each year relative to the multi-period total.⁸ Burkhauser and Poupore (1997), in the first paper to employ the measure within a cross-national framework, provide a detailed discussion of its calculation.

Measures based on transition tables

Many studies of mobility provide transition probability matrices from the data rather than a Shorrocks R scalar measure of it. Comparing these matrices across studies to draw inferences about which country or time period is characterized by more mobility is difficult. Shorrocks (1978b) considers how these transition probability matrices could be converted into summary measures of mobility similar to R .

Probability matrices contain the conditional probability that a person who starts in one group in period 1 will be observed there or in a different category later. When viewing these square matrices, the diagonal elements provide the probabilities that a person who starts in one group remains there. Hence they are indicators of immobility.

Shorrocks (1978b) summarizes the information contained in these transition matrices by devising a measure of mobility that is confined to the $[0,1]$ interval and requires that it increase in value as the probabilities in the off-diagonal elements rise. He also requires the measure equal 0 if all the off-diagonal elements are zero and refers to this as perfect immobility. Perfect mobility occurs when there is no systematic relationship between where a person starts and finishes. This concept is referred to as origin independence in the intragenerational mobility literature. Origin independence requires that all values in the probability transition matrix

⁸ Goebel (2007) modifies the Shorrocks R to measure persistent poverty rather than inequality and provides an empirical application comparing the USA and Germany from 1984–2002 using the PSID and GSOEP.

are equal. Shorrocks (1978b) requires the index to take the value of 1 in this case.

Shorrocks (1978b) notes that it is desirable for the value of a mobility index to increase monotonically as the off-diagonal probabilities rise in value. This implies that when the off-diagonal elements have a value of one, the index itself is at its maximal value. Shorrocks (1978b) also notes that it is desirable for the mobility index to take its maximum value when all elements in the matrix are identical. But he shows that it is not mathematically possible for a single index to have both properties.

This conflict in how to norm (assign the interpretation attached to) the upper value of a mobility index is a recurring theme in this literature.⁹ Shorrocks (1978b) resolves this conflict by restricting his measure to realistic cases. One is where the probabilities in the diagonal elements of the transition matrix are always greater or equal to the probability of transitioning to any other state so that the measure has a unique upper limiting value of 1. Shorrocks (1978b: 1017) notes other restrictions that can be imposed for this property to hold.

Given this restriction, Shorrocks (1978b) proposes the mobility measure:

$$M(P) = \frac{n - \text{trace}(P)}{n - 1} \quad (6)$$

In the case of a perfectly mobile transition probability matrix $\text{trace}(P)$ will be 1 and $M(P)$ will take the value of 1 indicating perfect mobility.

An alternative axiomatic approach

There are different notions of what mobility implies. Fields and Ok (1999) use an axiomatic approach which allows the portion of income increases due to economic growth to be incorporated in a measure of mobility. The measure can also be decomposed into the portions of mobility due to income growth and to changes in individual positions.

We have already discussed three of the conditions Fields and Ok (1999) impose on their measure: scale invariance, symmetry, and subgroup decomposability. The other is multiplicative path separability. This condition allows growth in incomes over time to be decomposed. Using their notation, if from time 0 to 1, incomes grow at a rate of β , and from time 1 to 2 at a rate α/β , then growth from period 0 to 2 equals α or $(\beta^*(\alpha/\beta))$. As long as income paths decompose in this manner, the condition of multiplicative path separability is satisfied.

⁹ Both Dragoset and Fields (2006) and Jenkins and Van Kerm (2006) consider different indices which estimate these concepts separately. Gottschalk and Spolaore (2002) also provide methodological advances regarding this measurement issue.

Fields and Ok (1999) prove that only income movement measures of this form satisfy these properties:

$$m(x, y) = c \left(\frac{1}{n} \sum_{i=1}^N |\log y_i - \log x_i| \right) \quad (7)$$

where c is a constant greater than zero, and x and y are a person's income at two points in time. Setting $c = 1$ yields the average absolute value of proportional income changes. This mobility measure treats positive and negative changes in the same manner; they are movements. Because positive movements imply welfare increases and negative ones decreases, Fields and Ok (1999) also develop a directional measure so that positive and negative changes over time are treated differently; however, the functional form is similar to the mobility measure they propose:

$$d_n(x, y) = c \left(\frac{1}{n} \sum_{i=1}^N (\log y_i - \log x_i) \right). \quad (8)$$

Again setting $c = 1$, the directional mobility measure is the average (geometric) proportional change in individual incomes. A positive value means that total income movements have been welfare increasing. Using their mobility measure, Fields and Ok (1999) also decompose all percentage changes in income into components due to growth or changes in position:

$$m_n^*(x, y) = \left(\frac{1}{n} \sum_{i=1}^N (\log y_i - \log x_i) \right) + \left(\frac{2}{n} \sum_{i \in L} (\log y_i - \log x_i) \right). \quad (9)$$

The first term on the left represents the average welfare change due to growth and the second captures transfers from losers (those whose income declines) to gainers.

Welfare interpretations

The best-known measures of inequality are not derived from the class of standard utility functions used in microeconomic theory. However, studies of the relationship of social utility functions to measures of inequality are common. Atkinson (1970) provides the first formal examination of the relationship of social inequality measures to social welfare functions. He shows that since the mathematical properties imposed on measures of social inequality are similar to those underlying utility functions, in many cases, they have a welfare interpretation. Chapter 3 considers this issue in more detail.

Intragenerational mobility, permanent, and transitory inequality

The Shorrocks R is the ratio of a multi-period measure of inequality which reduces the influence of short-term or transitory phenomena to a weighted average of

single-period measures which fully reflect both permanent and transitory influences on inequality. At a conceptual level, the Shorrocks R can be thought of as the ratio of permanent to total inequality.

A largely separate empirical literature which incorporates these same concepts has sought to identify the extent of permanent and transitory variance in individual labor earnings. In its best-known formulation (Gottschalk and Moffitt, 1994), this literature seeks to understand for each individual how much of their earnings variation is due to a permanent component versus transitory error. The permanent component is the average observed for each individual in the sample over the time frame of the study. The transitory components are the deviations of each observation from the individual averages. The variance due to the permanent component is calculated using the individual averages. The variance of the transitory components is computed using all of the individual deviations in the sample.

Given the importance of this literature, we provide the basic formulas used to calculate the permanent and transitory variances by Gottschalk and Moffitt (1994) so that the reader can see the differences relative, for example, to the formula for permanent variance imbedded in the Shorrocks R as used by Burkhauser and Poupore (1997).

In equation (10), v is the transitory component of labor earnings and in equation (11) μ is the permanent component of labor earnings. The outcome values, y , are in natural logs.

$$\sigma_v^2 = \frac{1}{N} \sum_{i=1}^N \frac{1}{(T-1)} \sum_{t=1}^{T_i} (y_{it} - \bar{y}_i)^2 \quad (10)$$

$$\sigma_\mu^2 = \frac{1}{N-1} \sum_{i=1}^N (\bar{y}_i - \bar{y})^2 - (\sigma_v^2 / \bar{T}) \quad (11)$$

Loosely, Shorrocks R can be written as

$$R \approx \frac{\sigma_\mu}{\sigma_\mu + \sigma_v}. \quad (12)$$

Conceptually, this observation provides a link between studies which are primarily interested in changing volatility of the permanent and transitory components of earnings and measures of intragenerational mobility. Although Gottschalk and Moffitt (1994) provide estimates of σ_μ^2 and σ_v^2 that can be used to infer the value of Shorrocks's R, caution should be used in doing this because they pre-adjust observations of labor earnings used in their calculations for position in the age-earnings profile to make them more comparable.

Baker and Solon (2003) extend the framework of Gottschalk and Moffitt (1994) to more fully specify the sources of transitory variation. By fully modeling the transitory error to consist of both systematic shocks and random errors, they reduce

the portion of overall variance considered transitory. Their model also allows for the permanent and transitory components to change over time.

3. DATA REQUIREMENTS, RESEARCH FOCUS, AND CHOICE OF MEASURES

Empirical studies of inequality require appropriate data. Since the 1960s the applied intragenerational mobility literature has experienced major advances. Those advances were made possible by the development of panel data and the increased ability of researchers to process these data with modern computers.

The first and best-known panel data set, the Panel Study of Income Dynamics (PSID), was launched in 1968. It was more than a decade before similar large-scale panel surveys began in Europe. Today, there are several ongoing European panel data sets and this has fostered the development of cross-national applied research on intragenerational mobility. But panel data sets that resurvey individuals over time are still relatively less common than cross-sectional surveys.

A very practical consideration in cross-national comparative research is that for the analysis to be valid the data, either as initially collected (*ex ante*) or adjusted later (*ex post*) must reflect the same conceptual content. But reconciling the differences across surveys and data sources so that they reflect similar conceptual content is a difficult, time-consuming task.

One example of a useful approach to obtaining equivalent data for cross-national comparisons of intragenerational mobility is the Cross National Equivalency File (CNEF). This ongoing *ex post* effort by researchers at Cornell University takes separately fielded country panel data (the United States PSID, the German Socio-Economic Panel (SOEP), the British Household Panel Study (BHPS), the Canadian Survey of Income and Labor Participation (SLID) and the Household Income and Labor Dynamics Study of Australia (HILDA)) and provides researchers with comparably recoded versions of key variables for analysts to use in cross-national research. See Frick, Jenkins *et al.* (2007) for a fuller discussion of CNEF.¹⁰

A different approach can be found in the *ex ante* effort begun in 1994 to field the European Community Household Panel (ECHP) via simultaneously collected equivalent panel data in all European Union countries by the Statistical Office of the European Communities. While in principle this is a better way of providing

¹⁰ The first major attempt to systematically gather data across countries and organize them into a comparable format did not occur until 1983 when the Luxembourg Income Study (LIS) was launched. Atkinson and Brandolini (2001) discuss issues researchers using cross-sectional data sets on individual countries to compare levels of income inequality and its trends must consider.

a harmonized family of country data sets, in practice the ECHP ran into early problems of attrition which led it to drop its efforts in Germany, Great Britain, and Luxembourg and replace those data with ongoing panel studies—the GSOEP, the BHPS and the Panel Study, Living in Luxembourg (PSELL) respectively. There were additional concerns as well regarding the timeliness of cross-sectional information that could be obtained from panel surveys. Ultimately, these concerns led to the ECHP being discontinued in 2001. For those still interested in using the ECHP data because of its potential for multi-period analysis, the critical issue is differential attrition bias that is known to exist in the country panels.

Even when data are harmonized across sources of income, in their treatment of sharing units, and in the other characteristics considered in Lillard (2007), differences can arise that will bias cross-national comparisons.¹¹ One is top-coding.¹² To preserve confidentiality, surveys often top code reported labor earnings and other sources of income. Over time, if these top codes are not systematically adjusted, inflation as well as economic growth will push an increasing share of the highest values above the top codes. The majority of those with top-coded sources of income are in the top percentiles of the overall income distribution, but because these top codes are on individual sources of income, others with top-coded income sources are scattered among household incomes percentiles throughout the income distribution. Therefore these top codes will not only impact measured trends in mean household income and in scalar measures of overall household income inequality but they will also impact comparisons of points in the household income distribution over time such as 90/10 ratios. Burkhauser *et al.* (2007) document this problem in the Current Population Survey which is the most common data used to track income inequality in the United States both internally and in the context of cross-national comparisons. Hence in a comparative international context, the challenge is to adjust for differential top codes across the components of income as they occur in multiple surveys across countries. This is important since top codes themselves, by impacting the underlying distribution of the measure of economic well-being being considered, can directly impact measures of inequality and the cross-national inferences being made (see Levy and Murnane, 1992 and more recently Burkhauser *et al.*, 2007 and Larrimore *et al.*, 2008).

Within both cross-sectional and panel data sets, a wide variety of measures of economic well-being are available for use by researchers. However, in individual studies, researchers commonly only consider one. Their choice to use only one measure or to contrast several is related directly to the study's goals. In past studies, researchers have focused on hourly wage rates, labor earnings, household

¹¹ For instance, Frick and Grabka (2007) show the sensitivity of inequality estimates to different methods of imputation of missing data across surveys.

¹² Comparative results have also been shown to vary with the use of purchasing power parity adjustments (Brandolini, 2007b).

size-adjusted income and its public and private subcomponents, including taxes and transfers. Here, we briefly discuss this issue.¹³

The most basic inquiries examine the market reward for work by asking how much inequality is associated with rewards from an hour's work (hourly wage and its dispersion). Abstracting from global economic conditions, differences in inequality in market wage rates across countries are used as a marker of those societies' acceptance of differential market rewards and their willingness to reduce it via laws or social conventions. Gottschalk (1993) provides an excellent study which considers wage inequality across countries as well as its contribution to income inequality.

While wages rates are important in determining consumption possibilities for any individual, people must also decide how many hours to work. That choice is impacted by a broad array of social influences. But when the analysis is widened to consider the interaction of the wage rate with hours of work, individual choice can be an important influence on total labor income. Thus, if a study examines both wages and individual labor earnings across countries, it can make statements regarding the degree of inequality in rewards across countries while differentiating between the basic influences of market rewards and work choices.

The vast majority of individuals live in households. The first consideration in assessing consumption opportunities of individuals living in households is that there are more potential wage earners; however, income must be shared among more people. As individuals are added to a household, the associated expenses do not increase linearly. While it requires an assumption about the returns to scale of households of different sizes, equivalence scales can be used to adjust the consumption power of individual incomes.¹⁴ Moreover, the inclusion of private sources of non-labor income allows analysts to examine the impact of private wealth holdings as an influence on current income.

An additional consideration beyond the particular measure (wages, labor income, household equivalent income) of well-being used in the study is the role of government. Considering any of these measures in the absence of either government transfers or taxes informs us about some of the variation generated by the market. However such measures are not a pure reflection of the impact of the market because to literally believe them is to accept the counterfactual that government's presence has no impact on individual behavior.

Nonetheless, it is of value to look at the ability of individuals and families to generate resources for themselves and then as a first approximation use these values to examine the role of government. If one were going to fully integrate the role of government into the analysis, the data should be adjusted for both taxes and

¹³ Gottschalk (1997) provides a similar discussion to the one presented here in the context of cross-sectional inequality measurement.

¹⁴ Burtless and Karoly (1995) and Burkhauser *et al.* (1996) provide useful discussions of the impact of different methods of calculating equivalent family income on resulting measures of inequality.

transfers. Many data sets now have post-tax, post-transfer measures of household income available for analytical use—disposable income.

4. THE LITERATURE ON INTRAGENERATIONAL MOBILITY

In Table 21.1 we characterize empirical research on intragenerational mobility by whether a study considers one outcome measure (labor earnings, equivalent household income, etc.) or provides a contrast across several as well as by whether the study considers one country or provides a cross-national comparison. We identify the specific countries, time periods, and measures of well-being considered in each study.

Virtually all of the studies in Table 21.1 begin with a cross-sectional examination of inequality. This is not a perfunctory exercise since the panel data used in these mobility studies require respondents to be present for many years. So, demonstrating that the sample drawn for longitudinal study exhibits similar patterns of inequality to those found in cross-sectional analysis using the full sample reinforces the validity of the remainder of the study.

One major question in the empirical literature on intragenerational mobility is whether greater cross-sectional inequality is associated with larger intragenerational mobility. Do the most heavily market-orientated countries with relatively large cross-sectional levels of inequality such as the United States have greater rates of mobility and hence less permanent inequality?

Most studies find no strong relationship between cross-sectional inequality and mobility. Burkhauser *et al.* (1997a, 1997b, and 1997) draw this conclusion using measures of labor earnings, equivalent pre-government household-size-adjusted income, and post-government household-size-adjusted (disposable) income based on harmonized CNEF data for Germany and the United States. These findings have been examined in subsequent studies which confirm their findings. Gottschalk and Spolaore (2002) use the same data and draw the same conclusion although their study only considers post-government household-size-adjusted income. Similarly, Maasoumi and Trede (2001) confirm this finding using pre- and post-government household-size-adjusted income as do Jenkins and Van Kerm (2006) examining post-government equivalent income.

Ayala and Sastre (2002) further consider post-government household-size-adjusted income, using data from some of the ECHP countries (UK, Spain, France, and Germany) and the PSID (USA), to address this question and conclude (p. 31) that, 'the most significant result is the absence of any clear relationship between

Table 21.1. Studies of intragenerational mobility

Author (Year)	Data (Years)	Countries	Income Measure
Aaberge <i>et al.</i> (2002)	LDB IDS, TAF Level of Living Surveys, PSID	Denmark Norway Sweden USA	Labor earnings, market income, post-government equivalent household income (Head and partner)
Auten and Gee (2007)	Tax Filings (1987, 1996)	USA	Total income and size adjusted for joint tax filings
Ayala and Sastre (2002)	ECHP (1993–97) PSID (1992–96)	UK, Spain, France, Germany, USA	Post-government equivalent household income
Burkhauser <i>et al.</i> (1997a)	PSID (1984–89) GSOEP (1984–89)	Germany, USA	Pre-government labor earnings
Burkhauser <i>et al.</i> (1997b)	PSID (1984–89) GSOEP (1984–89)	Germany, USA	Labor earnings, pre-government equivalent family income, post-government equivalent family income
Burkhauser and Poupore (1997)	PSID (1984–89) GSOEP (1984–89)	Germany, USA	Labor earnings, pre-government equivalent family income, post-government equivalent family income
Dahl <i>et al.</i> (2007)	SSA (1980–2003) SIPP (1991–93)	USA	Labor earnings
Dickens (2000)	NES (1975–94) BHPS (1991–94)	Britain	Labor earnings
Dragoset and Fields (2006)	SIPP–SSA PUF (1990, 1991, 1992, 1993, 1996 SIPP panels covering 1990–99 inclusively)	USA	Labor earnings
Fields and Ok (1999)	PSID (1969–86)	USA	Pre-government post-tax household income
Gangl (2005)	CNEF (1992–97) ECHP (1994–99)	Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, UK, USA	Post-government equivalent household income

Gittleman and Joyce (1999)	PSID (1968-92)	USA	Pre-tax, post-transfer equivalent family income
Gottschalk (1997)	PSID (1974-91)	USA	Labor earnings
Gottschalk and Spolaore (2002)	PSID (1984-93)	Germany, USA	Post-government equivalent family income
Gustafsson (1994)	GSOEP (1984-93)	Sweden	Individual post-tax income post-government equivalent income
	Sweden Tax Register (1971-80)		
	Sweden Household Income Surveys (1980-81)		
Jarvis and Jenkins (1998)	BHPS (1991-94)	Britain	Post-government equivalent household income
Jenkins and Van Kerm (2006)	CNEF (1980-2000)	USA (1981-92) Germany (1985-99)	Post-government equivalent household income
Maasoumi and Trede (2001)	CNEF (1984-88)	USA (1984-88) Germany (1984-88)	Pre and post-government equivalent family income
Schiller (1978)	LEED-SSA (1957-71)	USA	Individual earnings
Van Kerm (2004)	CNEF (1985-97)	USA, Germany (1985-97)	Post-government equivalent household income
	SEP (1985-97)	Belgium (1985-97)	
Kopczuk <i>et al.</i> (2007)	CWHS (1937-2004)	USA (1937-2004)	Individual labor earnings
	LEED-SSA (1957-2004)		
Zaidi <i>et al.</i> (2005)	GSOEP (1990-2000)	Germany	Post-government equivalent household income
	BHPS (1990-99)	Britain	

inequality and mobility'. Aaberge *et al.* (2002) compare inequality and mobility across Denmark, Sweden, Norway, and the United States in the period from 1980–90. They use data from the Longitudinal Data Base (LDB) for Denmark, the Income Distribution Survey (IDS) and Tax Assessment Files (TAF) for Norway, and the Level of Living Surveys (LOL) for Sweden. They similarly conclude that there is 'no evidence of a *positive* relationship between inequality and mobility'. Gangl (2005), using data from the ECHP and CNEF, considers the largest set of countries (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, UK, USA). He also focuses on post-government household-size-adjusted income and similarly concludes that cross-sectional inequality in the United States is relatively high but that intragenerational mobility is not.

Researchers using the CNEF to focus on the relationship between cross-sectional inequality and intragenerational mobility in Germany and the United States, as well as researchers using additional countries from the ECHP, and even researchers such as Aaberge *et al.* (2002) who use both national registers and panel data sources draw similar conclusions. Countries with relatively large inequality do not appear to have systematically higher mobility.¹⁵

A second but related question in the empirical literature on intragenerational mobility is the degree to which inequality falls in a country when multiple periods of data are used rather than one. All Table 21.1 studies regardless of their measure of welfare or countries considered find that inequality falls as the time frame expands. Most of the decline usually occurs in the first few years. For example, Gittleman and Joyce (1999) find that approximately two-thirds of the reduction in inequality they observed over the 10 years of their study occurred in the first five years. Gustafsson (1994: 85), who considers a 10-year panel (1971–80) of tax register data on individual post-tax incomes, similarly concludes that, 'The pace by which immobility decreases over time is not constant but decreases'.

Few of the Table 21.1 studies test the sensitivity of their results using alternative measures of well-being. Nonetheless, initial evidence suggests that the size of the decline in inequality over time systematically varies with the measure of income used. Burkhauser *et al.* (1997b) and Burkhauser and Poupore (1997) in their studies of Germany and the United States each consider labor earnings as well as pre- and post-government equivalent household income. These studies find that cross-section inequality is greatest for labor earnings, less so for pre-government equivalent income, and least for post-government equivalent income. However,

¹⁵ While the results across studies are in accord, it should be noted that the attrition rates in some of the countries included in the ECHP countries raise concerns. For example, a comparison of income inequality rates in the ECHP survey of Italy compared with those found over the same years by the Bank of Italy's Survey of Household Income and Wealth in Brandolini (2007a) provides evidence regarding the impact of attrition problems in the ECHP survey of Italy on empirical inequality research.

when inequality in labor earnings is computed over time, its level of inequality falls, by approximately one-quarter. In contrast, the level of pre-government equivalent income inequality falls by approximately one-third and that of post-government equivalent household income by one-tenth over time.

Summary measures of mobility consistently find that the majority of the cross-sectional inequality, 60 to 90 percent, in most societies is persistent. A related topic of interest is whether there is differential mobility across the distribution of well-being within the countries included in Table 21.1. The finding that the majority of cross-sectional inequality is persistent over time is consistent with findings of the individual studies that there is very little economic mobility from the very bottom of the distribution to the top. The majority of economic mobility occurs over fairly small spans of the distribution of well-being and those at the top of the distribution are less likely to move down. The most recent evidence on this issue for the United States can be found in two studies based on administrative records (Auten and Gee, 2007 and Kopczuk *et al.*, 2007). Auten and Gee (2007) make use of tax filings in their calculations while Kopczuk *et al.* (2007) look at mobility in earnings in Social Security records as did Schiller (1978). Dragoset and Fields (2006) provide evidence that mobility estimates using administrative records such as those employed in these two studies yield estimates similar to those obtained from panel survey data. Jarvis and Jenkins (1998) provide evidence for Britain. Comparative evidence on mobility from different points in the distribution for Germany and the United States can be found in Burkhauser *et al.* (1997a, 1997b).

A more recent topic of interest is whether mobility has changed over time. Gittleman and Joyce (1996) use the PSID from 1968–92 to examine patterns of US mobility in pre-tax, post-transfer equivalent family income and conclude that mobility was fairly constant. Similarly, Dahl *et al.* (2007) examine US individual labor earnings from 1980–2003 using Social Security program data and conclude that the trend in income variability has been flat. This was during a period of widening cross-sectional inequality. Kopczuk *et al.* (2007) also use US Social Security program data to examine individual earnings mobility but do so since 1937. They also conclude that trends in long-term mobility over the past several decades have been essentially unchanged. Dickens (2000) uses the New Earnings Survey (1975–94) and the BHPS (1991–94) to examine wage mobility in Great Britain. He concludes that British inequality has risen over time and that mobility has declined. This area of research is relatively new and suggests that long-term trends of mobility in US household income and labor earnings have been stable over the past two decades. However, given the scant international evidence, we view this as a fruitful area of future research.

A final issue in the empirical literature on intragenerational mobility is whether the welfare of the typical citizen improves with economic growth. As discussed

above, the Fields and Ok (1999) index of income movement allows one to consider this question.

In the cross-sectional inequality literature, Burkhauser *et al.* (2004), use descriptive graphical methods to plot distributions of household size-adjusted incomes over time and find that over the 1990s business cycle in the United States (1989–2000) overall cross-sectional inequality increased but the entire distribution of income improved. In real terms, the average person at every decile of the distribution earned more. In contrast, Burkhauser *et al.* (1999), using similar methods, found that over the 1980s business cycle in the United States (1979–89) overall cross-sectional inequality increased but there was a decline in the size-adjusted incomes of those at the bottom of the distribution. Calculations using the Fields and Ok (1999) mobility index can capture these types of changes over different time periods.

Fields and Ok (1999) consider total movement of equivalent pre-tax post-transfer incomes from 1969–76 and 1979–86 using US PSID data. They report more total income movement in the later period, a time of increasing cross-sectional inequality. Using their directional measure, they find that the increased movement of incomes from 1979 to 1986 was welfare reducing.

Also, the use of the Fields and Ok mobility measure may change relative rankings across countries in the degree of permanent inequality. Van Kerm (2004) uses panel data from the German SOEP, the Belgian Socio-Economic Panel, and the US PSID from 1985–97 to examine intragenerational mobility in post-government equivalent income by computing the Shorrocks R and finds that the United States has the greatest degree of permanent inequality. However, when he computes the Fields and Ok mobility measure, the United States has the largest amount of income movement. This larger movement is most associated with re-rankings of individuals within the US distribution.

In a conceptually similar paper, Zaidi *et al.* (2005) consider the mobility of incomes among older residents of Germany and Britain. Using both Shorrocks R and the Fields and Ok index of total income movement, they find that older British citizens experience more economic instability. Thus, the use of the Fields and Ok index does not always change rankings based on the Shorrocks R.

5. CONCLUSIONS AND FUTURE RESEARCH

The maturing of individual-based panel studies first in the United States and more recently in European Community countries has spawned an empirical literature on intragenerational mobility resulting in plausible evidence on how it varies over time

and across countries as well as how cross-sectional inequality is related to mobility. While more research is needed, a picture is emerging:

- Most studies find no clear relationship between greater cross-sectional inequality and greater intragenerational mobility.
- All studies find that inequality falls as the time frame expands regardless of the measure of welfare or countries considered, and that most of the reduction usually occurs in the first few years. But a large degree of permanent inequality remains.
- While the evidence is sparser, studies using alternative measures of well-being suggest that the decline in inequality systematically varies with the measure of income used.
- The few studies looking at trends in long-term mobility find little change over the past several decades in the United States.

Despite this progress, the field of intragenerational mobility research is relatively undeveloped in comparison to the cross-sectional inequality literature, due in part to more stringent data requirements. High quality person-based panel data is still relatively rare. And past efforts to assemble uniform *ex ante* panel data sets across countries have met with mixed success. Enhancing current country-based panel data and building new ones in other countries is necessary for better understanding of economic mobility over time as well as other types of dynamic social processes.

Despite their relative scarcity, greater use of existing panel data for cross-national comparative purposes is still possible. Few studies have used multiple measures of well-being across countries. Contrasting different measures of well-being within and across countries in integrated studies should increase our understanding of the role of different institutions (labor markets, family, and government) in contributing to mobility over time and in the reduction of inequality.

A consistent finding in the intragenerational mobility literature is that inequality declines (due to mobility) as years are added to the analysis. Nonetheless, these studies find that the majority of initial economic inequality remains. The best evidence indicates that between 10 to 40 percent of cross-sectional inequality is transitory. The percentage reduction in inequality is largest for pre-government equivalent household income followed by labor earnings and then by post-government equivalent income.

As existing panel data sets have matured and administrative files have become more accessible, the intragenerational mobility literature has begun to examine whether mobility has changed over time. This literature is progressing rapidly in the United States. Few studies exist for European Community countries and no comparative international study has explored temporal patterns of mobility.

Because the basic methodologies for measuring mobility are well developed, intragenerational mobility researchers have a common language to describe their

findings. Despite the very high quality of the early work which developed the most common measures of mobility, the discussion of what is meant by the word mobility continues. The ongoing importance of this topic as an area of research is demonstrated by the recent work of Fields and Ok (1999) which identifies the role of economic growth in income mobility.

The largest gap in the intragenerational mobility literature is the lack of systematic attempts to relate mobility to policy-relevant variables. Studies focusing on patterns of mobility across demographic subgroups have examined the role of taxes and transfers. Extending these studies to explore the roles of specific public programs and behavioral mechanisms would provide a major advance within the literature on intragenerational mobility.

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