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INCOME RISK IN 30 COUNTRIES

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We present a measure of income risk that decomposes income dynamics into long-run inequality, volatility (inter-temporal variability around individual-specific growth rates), and mobility risk (variation in individual-specific growth rates). We measure these income risk components in panel data from 30 rich democracies. We use this comprehensive collection of panel data to analyze long-terms trends in income dynamics for four countries (Canada, Germany, Great Britain, and the United States), and cross-national patterns of income dynamics for an additional 26 countries. We find that tax and transfer systems lower income risk, but less so in the United States than in other comparable countries. We find that higher incomes tend to grow faster and to be more volatile than lower incomes. We find that the United States is exceptional in its level of, and increase in, each type of income risk. Various other measures of mobility are positively correlated with mobility risk.

JEL Codes: D31, H24

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1. INTRODUCTION

There has been a renewed interest in recent years in income inequality, but also income dynamics such as economic mobility (moving up or down the income ladder), and income volatility or intertemporal variability (year-to-year variations in income that families may or may not be able to smooth over). However, a unified approach to measuring these phenomena has proved elusive.

We use an aggregate measure of income risk developed by Nichols (2008, 2010) for incomes measured over both people and time. The measure is related to but distinct from other measures in common use, and has the advantage that it is additively decomposable into interpretable components of income risk. The aggregate measure can be decomposed into an *inequality component* **I** measuring dispersion in mean incomes, a *volatility component* **V** measuring the average dispersion of fluctuations about person-specific trends, and a *mobility risk component* **M** measuring the dispersion of person-specific trends. We estimate the aggregate measure of income risk and apply the decomposition to panel data from 30 different countries to compare and characterize levels of, and trends in, inequality,

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volatility, and mobility risk. We also examine the regressivity of income growth in these data, and relate our measures to others commonly used.

The outline of the paper is as follows: we provide context and discussion in Section 2, then discuss methods and data in Sections 3 and 4, respectively. Because we need extensive panel data to examine the different components of income risk, we examine in Section 5 long time-series on income risk components for four countries: Canada, Germany, Great Britain, and the United States. In Section 6, we discuss results for an additional 26 countries at a recent point in time when data are available for each country. In Section 7, we compare our results on mobility risk to other measures of income mobility in widespread use, each of which uses an entirely different measure of income mobility, and find broad agreement across measures. Section 8 concludes with a brief discussion of policy implications of the estimates, and directions for future research.

2. Background

Inequality at a point in time is of little intrinsic interest if incomes are changing rapidly or frequently; it is long-run income inequality that reflects disparities of life chances. Incomes may be changing due to short-lived transitory shocks, or more permanent changes, but either kind of change induces greater volatility in the income stream and greater relative[1] mobility. Some view these changes as mitigating inequality (frequently citing Schumpeter, 1955 or Friedman, 1962), but if these changes reflect income risk, they lower well-being for any risk averse person, holding constant the mean level of income. This article inclines toward the latter viewpoint, and characterizes observed changes in income as reflecting underlying risk.

We will focus exclusively on measuring inequality, volatility (inter-temporal variability around trend), and mobility risk (variability in trends); we will not characterize their welfare consequences. However, we will discuss the connections between higher incomes and both higher average growth in real incomes and measured riskiness of incomes. The goal of this research is to identify measures that are transparent in interpretation and require minimal assumptions about the true distributions of income and income growth.

Inequality in observed incomes is not inequality in well-being, or other important outcomes such as mortality rates. Even if we regard income as a valid measure of well-being, inequality of observed incomes need not reflect inequality of potential income or opportunity more broadly. Measured inequality is positive when all incomes are drawn from the same distribution.

Volatility is the variability in incomes over time. Strictly speaking, volatility is never observed. As the volatility of share prices is estimated using historical data on changes in price, so income volatility is often measured as variation in income over time. However, this reflects behavioral changes, measurement error, and both short-term and long-term real changes in income. Some authors attempt to decompose variability of income over time into permanent and transitory shocks, but this requires specifying a model of income dynamics that makes rather strong assumptions.[2]

[1]Growth in incomes relative to average growth is called "relative mobility," so both volatility and mobility may result in reranking of individuals within the income distribution in any one period or over time.

[2]For example, that the model applies to all individuals (see, e.g., Lillard and Willis, 1978; Moffitt and Gottschalk, 1995; Baker, 1997).

In contrast, the approach adopted in this article imposes no distributional assumptions on income at a point in time or on income growth (though linear trends are measured, these are conceived as short-run approximations to arbitrary individual-specific paths of income over time). Instead, we measure "realized volatility" or the variability in incomes over time. Some of this realized volatility may be due to anticipated changes, such as intentional labor force exits, but we call our measure of variability in incomes over time "volatility" since that is the component it is intended to measure, in line with other authors who use the realized variability in incomes to identify the unobserved volatility risk, such as in Moffitt and Gottschalk (1995) or Shin and Solon (2010).

Mobility has been defined in many different ways, and the term encompasses many different concepts, such as relative and absolute mobility, or structural and exchange mobility. We define mobility as variation in individual-specific income growth rates (dispersions of person-specific trends). As such our measure does not pick up mobility per se, and yet higher variation in linear growth rates of income may well produce higher rates of income mobility by a variety of metrics. We compare our measure of mobility risk to several metrics of mobility, including reductions in period inequality and several measures based on period-to-period transition matrices, in Section 7.

3. Methods

Inequality and volatility are always characterized as some measure of dispersion, or variability, of a distribution. The method in this article uses inequality decompositions applied to panel data on individuals over time, using family size-adjusted family annual income as an individual's income at each point in time. The overarching idea of this approach is that variability in incomes can be decomposed across individuals and across time. Arraying panel data on income by individuals or by time suggests two decompositions by group, where group is defined by a time index t or alternatively by an individual index i. Decompositions of panel data in this way produce easily interpreted components.

A convenient choice of inequality measure for decompositions by group is the generalized entropy measure GE_2, equal to half the squared coefficient of variation, and we will use that measure throughout. Suppose we observe L people, indexed by i running from 1 to L, observed at T points in time, for $N = LT$ observations on income y. Call total inequality, across people and time, **R** for "risk" in income and consider a decomposition by population subgroup following Shorrocks (1984) where the population is all person-years and subgroups are people:

$$\mathbf{R} = \frac{1}{2\bar{y}^2}\left[L^{-1}\sum_{i=1}^{L} T^{-1}\sum_{t=1}^{T}(\bar{y}_i)^2 - \bar{y}^2\right] + \frac{1}{2\bar{y}^2}\left[L^{-1}\sum_{i=1}^{L} T^{-1}\sum_{t=1}^{T} y_{it}^2 - (\bar{y}_i)^2\right] = \mathbf{B} + \mathbf{W}$$

where $\bar{y}_i$ indicates the within-person sample mean of income over all time periods observed, and $\bar{y}$ is the sample mean of income over all persons and time periods. The first term **B** represents "between" variation across individuals in their mean income over some time period of T years, i.e. T-year inequality, where the absence of a subscript on T implies we use balanced panels. The second term **W** represents "within" variation of individual income around mean income. Correcting for estimation error in individual-specific means as in Nichols (2008), **B** and **W** are adjusted to account for the expected variation due to estimation error in within-person sample mean of income to compute new measures **I** and **D** (deviations). D is further decomposed as in Nichols (2008), and the revised decomposition can be written as

$$\mathbf{R} = \left(\mathbf{B} - \frac{\mathbf{W}}{T-1}\right) + \left(\frac{T}{T-1}\right)\mathbf{W} = \mathbf{I} + \mathbf{D} = \mathbf{I} + (\mathbf{V} + \mathbf{M}).$$

The first component **I** measures inequality in individual-specific mean incomes over time, or long run inequality. The second term **D** is the variance of deviations over time around the individual-specific means, which we further decompose into a component due to individual trends in income **M**, and a component due to variations around individual trend **V**. We call the terms **V** for "volatility" and **M** for "mobility risk" though of course other measures of those concepts are also possible.

The decomposition effectively regresses each individual's income on an individual-specific time trend and a constant. **V** is then the mean over individuals of the individual-specific sum of squared residuals (or variation in de-trended and de-meaned income), divided by twice mean income squared. **M** is the individual-specific variance of predicted income over T years, which is proportional[3] to the mean across individuals of the squared individual-specific trend (divided by twice mean income squared), a measure of the dispersion in the distribution of linear growth rates of income.

Estimating linear growth rates in individual incomes is not uncontroversial. Often, researchers assume a constant percentage rate of growth in incomes over time, or regress log income on time. But these assumptions do not match the empirical distribution of income growth rates, and they drop observations with zero or negative income in a period (limiting the sample to those with lower variation over time, since anyone with income that drops to or rises from that low level of income will have relatively high variation in income).

The regression framework illustrates the similarity of our decomposition to that of Gangl (2005), who decomposes variance in log incomes, rather than decomposing variance in incomes scaled by mean income squared. Practically speaking, we might expect estimates from Gangl (2005)—who essentially measures variance of deviations in percentage terms—to be similar to our scale-free measure of variance components, but there is no theoretical reason the two sets of estimates need coincide. We could also compute our measure using log income, but a GE measure computed in log income has no natural interpretation, unlike ours.

Log income is used by most contributions purporting to measure volatility, using a variety of methods, including, for example, Gottschalk and Moffitt (1994, 2009), Moffitt and Gottschalk (1995), and Shin and Solon (2010). Most approaches, except Gangl (2005), specify log income as evolving linearly with time or age *across*

[3]Specifically, the variance of predicted values is the squared growth rate times the variance of the time index, where the time index t is always defined so that it has mean zero; the constant term therefore measures mean income.

people, rather than *within* person, making such measures very different in conception and execution. However, assuming linear growth in log income is equivalent to assuming exponential growth in incomes, whereas individual earnings growth exhibits a concave path. If any log transformation matched the empirical growth rates of individual incomes, it would seem to be incomes regressed on log time, not log incomes regressed on time. On the other hand, a linear approximation to concave growth seems to fit individual growth paths well, and in polynomial approximations using short time windows, higher order terms typically have small coefficients not statistically different from zero. Linear growth over a small span of years, as assumed in this article, seems a reasonable approximation.

Neither the aggregate measure nor its components characterize the progressivity of income growth or the change in income inequality over time. Applying the identical decomposition to successive time periods, we estimate changes in inequality, volatility, and mobility across periods. A measure of changing ranks within the T-year period is the correlation of individual-specific estimates of mean income with individual-specific volatility and individual-specific mobility, which characterize the progressivity of volatility and growth, respectively.

To measure T-year inequality, volatility, and mobility, we need panel data, but we only need T years of data on each individual in a survey (and to use weighted means instead of unweighted means in the previous formulas). For example, we can use 3 years from a longer panel and measure 3-year inequality as the inequality across individuals in 3-year averages of income. If we want to measure trends in inequality, volatility, and mobility, we must have a longer panel, of course. Given a panel of some fixed length, for example 6 years of panel data for 2001 to 2006, we can imagine computing a single 6-year measure of inequality and other components using a very small balanced panel (for only those individuals observed in every survey year), or using the first 3 years (2001 to 2003) to construct one estimate and the next period of 3 years (2002 to 2004) to construct another estimate. Each period of T years overlaps for all but one year with the next, and we get a sense of the evolution of income risk over time by graphing each component's evolution.

4. Data

We rely on a variety of national and international panel data to estimate income inequality, volatility, and mobility risk.[4] We use household income

[4]This article makes use of several licensed datasets that require the following disclaimers: (i) We employ EU-SILC data (European Commission, Eurostat), cross-sectional files from 2006 (rev. 03–10) and 2008 (rev. 03–11), made available to Rehm by the European University Institute. Eurostat has no responsibility for the results and conclusions of this article. (ii) This article uses the HILDA-CNEF dataset, an equivalized subset of data from the Household, Income and Labour Dynamics in Australia (HILDA) survey provided through the CNEF project at Cornell University. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this article, however, are those of the authors and should not be attributed to FaHCSIA, the Melbourne Institute, or Cornell University. (iii) This study has been realized using the data collected by the Swiss Household Panel (SHP; made available via the CNEF project at Cornell), which is based at the Swiss Centre of Expertise in the Social Sciences FORS. The project is financed by the Swiss National Science Foundation. (iv) The SOEP data were made available to the CNEF by the German Socio-Economic Panel Study (SOEP) at the German Institute for Economic Research (DIW), Berlin.

adjusted for household size.[5] All calculations are restricted to persons 25 to 60 years of age in every year of data used, to abstract from level differences in schooling, early labor market adjustment, and retirement decisions. We construct two main concepts of household income: market income (gross income) and disposable income (net income). The calculation of gross and net income varies somewhat across our data sources.

For the United States, we use the Panel Study of Income Dynamics (PSID) for survey years 1970 to 2009 (income years 1969 to 2008). Because the PSID moved to a biennial survey in 1997, it makes sense to exclude every other year in earlier years as well, so that the concepts are the same in every year. A T-year estimate then covers $2T - 1$ calendar years, due to skipping every other calendar year in retrieving T years of data. Thus, with data from 1970 to 2009, we can, for example, construct 3-year estimates from 1972 (using 1970, 1972, and 1974 data and assigning estimates to 1974, the last year of data used) to 2009 (using 2005, 2007, and 2009 data), with gaps in 1997, 1999, 2001, and 2003.

For Australia (Household Income and Labour Dynamics in Australia; HILDA, 2001 to 2008), Canada (Canadian Survey of Labour and Income Dynamics; SLID), Germany (German Socio-Economic Panel; SOEP, 1984 to 2008), South Korea (Korea Labor and Income Panel Study; KLIPS, 1998 to 2007), Switzerland (Swiss Household Panel; SHP, 1999 to 2008), and the United Kingdom (British Household Panel Study; BHPS, 1991 to 2007) we rely on national panel data that have been made comparable in the Cross-National Equivalent File (CNEF). We refer to estimates for the United Kingdom as Great Britain because our data is representative only of Great Britain, not the entire United Kingdom.

We rely on the European Union Statistics on Income and Living Conditions (SILC, 2004 to 2007) for data on Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, and Spain. With the exception of Luxembourg, the SILC panels have a maximum length of four years.

Top-coded income could represent a major threat to these decompositions, since the GE_2 index emphasizes variation in larger incomes (whereas a 90/10 ratio would be largely immune to this threat); however empirically it does not appear to be a large issue (Nichols, 2008). Therefore, and for the sake of comparability, we top- and bottom-code our size-adjusted gross and net family incomes at p1 and p99, respectively.

A longer period T is desirable for better estimates of the volatility component, but clearly if we wish to measure trends, a shorter period is preferable, so that we may compute more estimates using periods of length T with a fixed amount of data. We will use $T = 3$, the minimum number required for the estimations.[6]

Because we use a balanced subsample for each time period, we need to address the panel attrition due to exits from the survey over time, and missing data, so we

[5]An online appendix provides details on the construction of the income variables.

[6]Results using $T = 5$ do not differ in any qualitative patterns discussed below, except that volatility appears higher in every year and long-run inequality lower (results available upon request).

construct specialized weights. We use the first year panel weights (adjusting for attrition from the survey up to that point) and calculate an adjustment factor to differentially adjust weights by $1/(1-p)$ where p is the estimated probability of attrition from a logit of attrition on initial income quintile dummies. Logit regressions using more characteristics to predict the probability of attrition produce qualitatively similar results, as do results with no adjustments for attrition.[7]

Another concern is that the variance of the idiosyncratic error term used to characterize volatility also captures measurement error, but this is in a deep sense inevitable—one cannot observe short-run variation in income and know whether it represents true short-run variation in income or mis-reported or mis-measured income. This applies even to administrative earnings records or to datasets with merged administrative records and survey responses (which we have for some countries in the SILC). The only approaches to separately estimate volatility and measurement error components require structural models of income distributions that can usually be rejected (in the statistical sense) by the very data used to fit them. To the extent that measurement error is increasing over time, any upward trend in volatility may represent increases in the volatility of true income, or increases in the volatility of measured income with no change in the volatility of true income.

We engaged in several benchmarking exercises, to get a sense of how our income concepts compare to official data. We draw benchmark data from the OECD (2008, 2011) and other sources. Comparing Gini coefficients published by the OECD (2008) and single-year Gini coefficients calculated using our data, for 1995, 2000, and 2005, we find broad agreement, with very high correlations of approximately 0.9 in each year. The OECD data refer to ages 18–65, while our estimates are for ages 25–60, and the OECD income data definitions and methods are not explicit, so we do not expect perfect agreement. We conducted these benchmark plausibility tests for both net income and gross income data.

5. Results for Canada, Germany, Great Britain, and the U.S.

Aggregate risk **R** estimates (three-year window, disposable (net) incomes) are summarized in Figure 1, panel R, for Canada, Germany, Great Britain, and the U.S. Displayed are years since 1986, the first year for which we have estimates for more than one country. The United States is a clear outlier in this set of four countries, with substantially higher aggregate risk in net income in every year examined. Moreover, the trend in all four countries is one of clearly increasing risk over time, but the risk is increasing substantially faster in the U.S. Not shown in Figure 1 are the estimates for the U.S. between 1974 and 1985, during which time **R** increased from a low of 0.22 in 1970–74 at the onset of the 1973 recession, to a

[7]In many panel datasets, the weights in a cross-section correct for attrition from the beginning of the panel up to that point in time, but are adjusted to reflect a variety of other factors, such as new population controls, and do not account for sample selection; it is advisable to create new weights for any analysis as described here. In the simplest case, new weights that adjust for panel attrition from year 1 through year 5 will match the cross-sectional weights provided on the file in year 5.

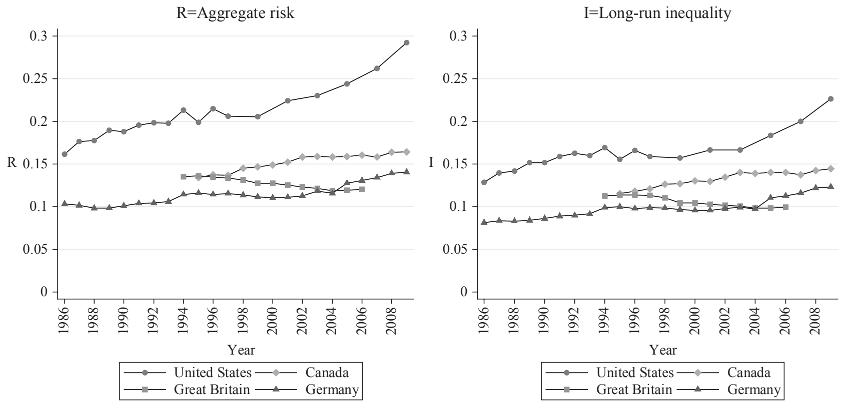

Figure 1. Aggregate Income Risk and Long-Run Inequality in the U.S., Germany, Great Britain, and Canada

high up to that point of 0.30 in 1985 during a recovery (more detailed analysis for the U.S. case alone is presented in Nichols, 2008).[8]

Decomposition of the aggregate risk index gives components measuring long-run inequality, volatility, and mobility risk. Estimates in Figure 1, panel I, show long-run inequality **I**, measuring inequality across people in income averaged over three calendar years. Long-run inequality is by far the largest component of aggregate income risk. It is highest in the U.S., and lowest in Germany, with Canada and Great Britain falling in between. Long-run inequality increased in all four countries, but especially in the U.S.

Estimates in Figure 2, panel V, show the component of the aggregate risk index we call **V** for volatility, or variation in income about individual-specific trends; and estimates of the component of the aggregate risk index we call **M** for mobility risk appear in Figure 2, panel M, for the same set of four countries. These components are small relative to long-run inequality and therefore can contribute very little to the trends in aggregate risk. However, it is clear that there is a pronounced upward trend in both volatility and mobility risk in the United States, and no evidence for upward trends in the other three countries. Hence, the U.S. is characterized not only by high levels of aggregate disposable income risk for all three sub-components we calculate, but also by sharp increases therein. While aggregated total income risk (**R**) and long-run inequality (**I**) have increased modestly in Canada, Germany, and Great Britain, variability (**V**) and mobility risk (**M**) show trendless fluctuation in these countries.

A comparison of gross (market) and net (disposable) income results is graphed as the ratio of gross to net income measures of aggregate risk **R** and long-run inequality **I** in Figure 3. Lower inequality in net incomes is to be

[8]There are limits to comparability across time and countries of course, as discussed above, with the biggest limit due to figures for U.S. data drawn from non-consecutive years and family income instead of household income (though estimates not reported here show little impact of these choices on either measure of aggregate risk). However, the use of a longer window of U.S. data actually lowers risk because incomes over five years tend to vary less across people than across three years, and long-run inequality is the dominant form of income risk.

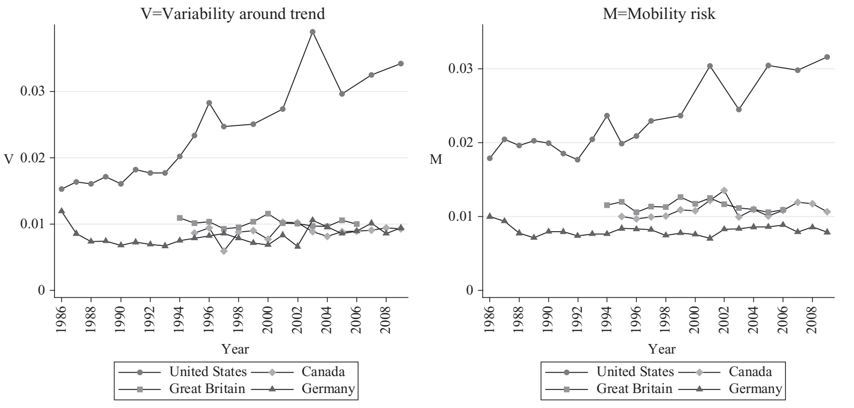

Figure 2. Variability around Trend and Mobility Risk in the U.S., Germany, Great Britain, and Canada

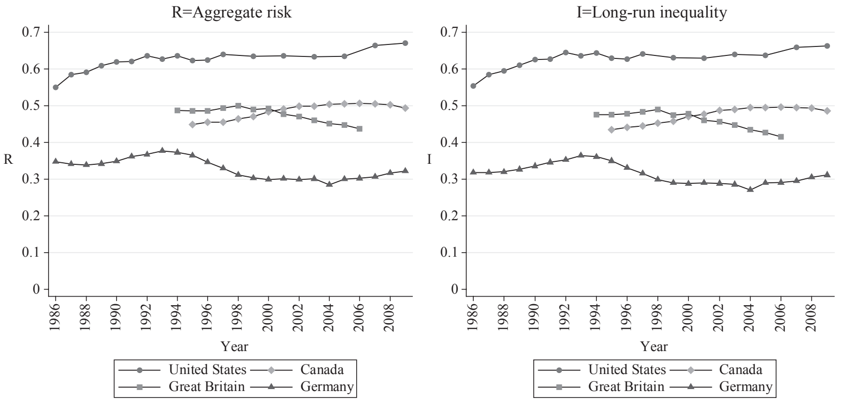

Figure 3. Ratio of Gross and Net Income Measures of R and I in the U.S., Germany, Great Britain, and Canada

expected, given the progressivity of the tax and transfer system, and the ratio of gross to net income measures displayed in Figure 3 are indeed smaller than unity. However, the difference between gross and net measures varies substantially across countries, to the extent that they change rank orders. The United States exhibits a substantially higher ratio of aggregate risk in net income to aggregate risk in market income in every year examined. The ratios graphed imply that long-run inequality in market incomes is roughly three times as high as long-run inequality in net incomes in Germany, roughly twice as high in Canada and Great Britain, and half as high again in the U.S.

This disparity means that long-run inequality levels that appear roughly comparable across the four countries when looking at market income look dramatically higher in the U.S. when looking at net income. Measured long-run inequality in market (gross) incomes is actually higher in most years in Germany than in the U.S. (not shown), but substantially lower looking at net incomes

(Figure 1, panel R), with Germany at 50–60 percent of U.S. levels. This is an important finding that suggests that market income distributions and market income dynamics are actually quite comparable across countries, while disposable income measures vary markedly. These differences likely reflect in part less generous social insurance programs and less progressive tax schedules, but probably also subtler differences in employment protection and variability in returns to education.

Interestingly, the ratio of aggregate risk in net income to aggregate risk in market income is fairly stable over time. There is a modest decrease over time in Great Britain, and increases in Canada and the U.S., presumably reflecting the net impact of many policy changes over this period. The decrease in aggregate risk in Great Britain reflects in part the end of retrenchments in welfare pursued by Thatcher's government, and 1997's New Deal Program, and in part the economic recovery of the 1990s. Canada and the U.S. both saw reductions in the progressivity of their tax and transfer systems during the 1990s and 2000s, and this explains part of the increase in the ratio of aggregate risk in net income to aggregate risk in market income. The increase in aggregate risk in market income is presumably driven more by macroeconomic factors, but may also be affected by policy, especially trade policy exposing workers to labor market shocks from import competition (Autor *et al.*, 2011), and corporate policy on cyclical employment changes (itself affected by relative costs of acquiring permanent and temporary staff).

Long-run inequality has been fairly stable in Canada from 1995 to 2007, at about 0.14 for net incomes and 0.28 for market income. U.S. long-run inequality in the mid-1980s was comparable to these levels, but rapidly rising inequality in the U.S. has outstripped these other developed economies, and the tax and transfer system has done little to halt that tide. In Germany, a rapid rise in market income risk in the 1990s, following reunification, was largely smoothed out by the tax and transfer system, apparently, as the same increase is not observed in net income risk. In Great Britain, no trend is evident, though the tax and transfer system evidently does more to reduce inequality and other kinds of income risk in Great Britain than in the U.S.

A comparison of gross and net income volatility and mobility risk is graphed as the ratio of gross to net income measures of **V** and **M** in Figure 4. Again we see lower risk in net incomes. The impact of taxes and transfers on estimated volatility and mobility risk is similar to the impact on long-run inequality, with net income measures about 60 percent of gross income measures in Canada and Great Britain (stable over time). The same ratio rises in the U.S., from about 60 percent in the mid-1980s to over 70 percent in the most recent year, while it falls in Germany from about 55 percent in the mid-1980s to about 45 percent in the more recent years.

For all four of these countries, the major component of income risk in our aggregate measure is long-run inequality, with a much smaller role played by volatility, and an almost negligible role of mobility risk. In the U.S. data series, increases in long-run inequality clearly drive the bulk of increases in the aggregate risk index. This is also true for Canada, where increases in risk in net income were much more modest, but again driven by increases in long-run inequality. Overall, the estimates suggest that long-run inequality in net incomes increased about 50 percent over the last 25 years in the U.S., but increased at a substantially slower rate in Canada, Great Britain, and Germany. Similarly, volatility risk appears to

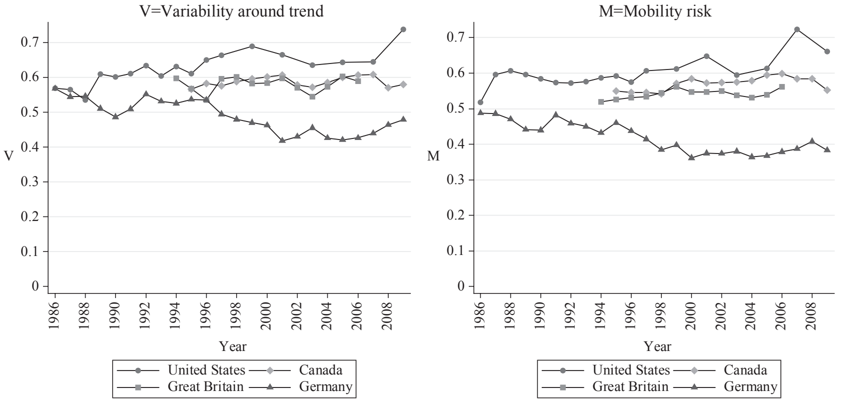

Figure 4. Ratio of Gross and Net Income Measures of V and M in the U.S., Germany, Great Britain, and Canada

have increased about 40–60 percent and mobility risk by about 30–50 percent over the same period in the U.S., but much slower in Canada, Great Britain, and Germany. The aggregate risk measure, summing inequality, volatility, and mobility risk, increased approximately 50 percent over the last 25 years in the U.S.

The pattern of higher intrinsic risk and smaller reductions in risk due to taxes and transfers (comparing net income risk to market income risk to measure the effect of taxes and transfers) in the U.S. compared to Canada and Europe is consistent with the broader literature on differences in the welfare state across developed economies, using a variety of different methods. Also, a variety of methods generate similar broad conclusions about the pattern of results found here; rising risk in gross and net incomes in the U.S. is a common finding, looking across such disparate sources as Piketty and Saez (2003), Autor *et al.* (2006), Kopczuk *et al.* (2010), or Burkhauser *et al.* (2011). The pattern in Germany of stable risk in net incomes as market income risk has risen is also broadly comparable to other findings, for example Bartels and Bönke (2010) using the Moffitt and Gottschalk (1995) approach.

6. Results for Thirty Countries

Data availability varies greatly across countries. The full set of estimates for each country and data source often does not overlap substantially with other countries, so rather than discussing trends for each country, we focus on estimates in the period 2001 to 2006, where we have one to four three-year risk estimates for each of 30 countries. The arithmetic means of these country- and year-specific estimates by country are presented in Figure A-1 for net income measures and Figure A-2 for gross income measures (see online appendix). Countries are ordered throughout by the estimated level of aggregate income risk **R** in net incomes.

As discussed in Section 5, aggregate income risk **R** increased in the U.S., Germany, and Canada over a long span of time, with by far the fastest rates of increase observed in the U.S. By the 2001 to 2006 period, the U.S. had higher aggregate risk in net incomes than nearly all countries examined. Only Portugal, Korea, Latvia, and Lithuania had higher estimated aggregate risk in net incomes than the U.S. The aggregate risk differences are driven by differences in long-run inequality. In most countries, long-run inequality accounts for about 80 percent of aggregate risk, with variability around trends and mobility risk accounting for about 10 percent of aggregate risk each. Rankings based on long-run inequality instead of aggregate income risk would look much the same.

A large number of countries have higher aggregate risk in gross incomes than the United States, including Italy, Spain, France, and Germany, as can be seen in Figure A-2. The level of aggregate risk in gross incomes is still broadly decreasing as we look down the list of countries ordered by aggregate risk in net incomes, but evidently these countries' tax and transfer systems differ substantially in the extent to which they smooth differences in gross income across people and time. It is still true however that long-run inequality accounts for about 80 percent of aggregate risk in most countries, with variability around trends and mobility risk accounting for about 10 percent of aggregate risk.

Cross-national comparison of the ratio of net to market income risks (Figure 5), which is also driven by long-run inequality, shows that only in Korea is the ratio larger than in the U.S. Government intervention in these two countries evidently does not much reduce long-run inequality, nor aggregate income risk. However, in most countries the ratio of pre-government (gross income) to after-government (net income) multiperiod inequality is lower than one half, about the level of reduction in Canada, suggesting that government intervention substantially reduces long-run inequality and aggregate income risk in most countries. Looking at market (gross) income (income before taxes and transfers), the difference between the U.S. and other countries is much less clear. Evidently tax and transfer systems do more in other countries to mitigate gross income risk than the U.S. system. Sweden and Norway have moderate levels of risk in market incomes, but those have the two lowest levels of risk in net incomes, and have risk in net incomes less than 22 percent of risk in gross incomes, suggesting that the tax and transfer systems in those two countries dramatically reduce income risk.

Volatility estimates are roughly half as large for post-government income as for pre-government income in most countries, though Cyprus and Iceland exhibit higher ratios, and Korea is at 90 percent. In other words, in most countries, taxes and transfers cut volatility roughly in half. However, the pattern of reductions in volatility is similar to reductions in long-run inequality: the volatility reduction due to the tax and transfer system in the U.S. is 36 percent, while in Sweden it is 65 percent (only Switzerland, Korea, Iceland, Cyprus, and Lithuania have higher ratios than the U.S.).

The tax and transfer system results in similar percentage reductions in estimated mobility risk as in the volatility measure, roughly a third to two thirds, with most near one half. Only Cyprus and Korea exhibit little to no reduction in estimated mobility risk, with ratios of net to gross income mobility risk near unity. The U.S. has higher ratios of net to gross income risk than comparable countries, meaning the tax and transfer system does less to lower mobility risk than in most countries examined (only Switzerland, Greece, Korea, Iceland, Cyprus, and Lithuania have higher ratios).

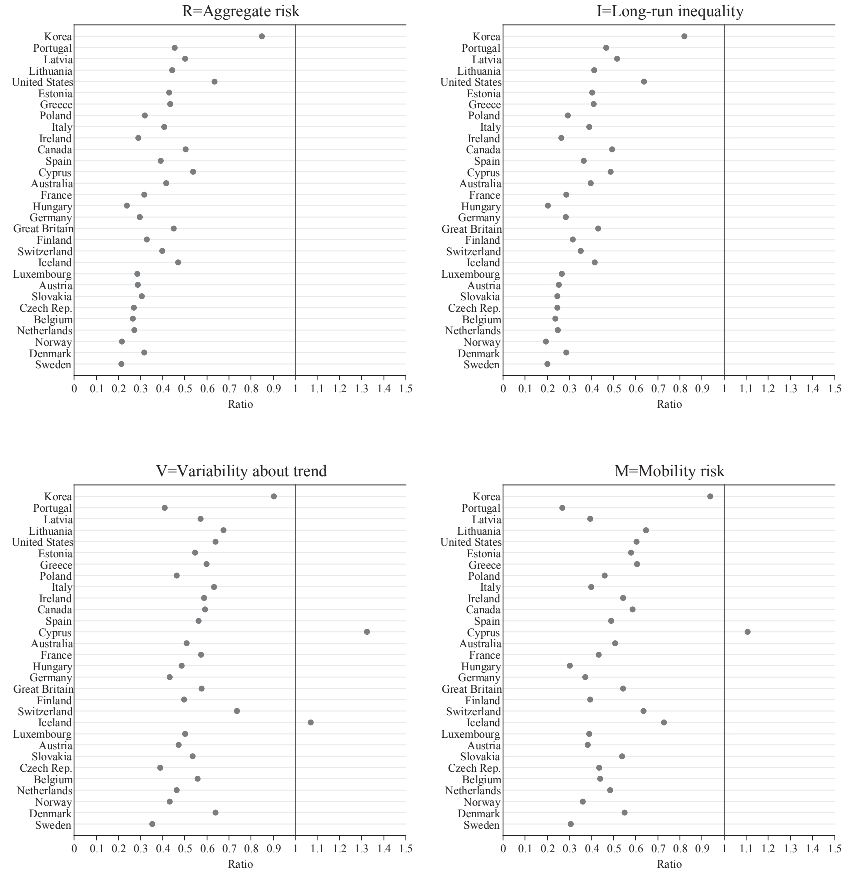

Figure 5. Ratio of Net to Gross Income Measures of Income Risk in 30 Countries, 2001–2006

The reductions in risk due to tax and transfer systems are highly related to the overall level of risk, with a strong positive relationship between mean reduction in long-run inequality due to the tax and transfer system and mean long-run inequality and a strong positive relationship between mean reduction in long-run volatility due to the tax and transfer system and mean long-run volatility (Figure 5). The mean reduction in long-run inequality and the mean reduction in long-run volatility due to the tax and transfer system are strongly positively related to each other (but the U.S. is an outlier, with modest reductions in long-run inequality but larger reductions in volatility when moving from gross to net income definitions). One would expect such a positive relationship from the Meltzer and Richard (1981) model of increasing inequality causing the median voter to support a more progressive tax and transfer system, which casts some doubt on the so-called “Robin Hood paradox” (Lindert, 2004). However, these correlations are largely driven by mechanical relationships between level and reduction, and correlation of the level of inequality and volatility. Proportional reductions do not exhibit such a clear relationship, though there is a different mechanical bias introduced when dividing by the level (Borjas, 1980).

The progressivity or regressivity of income growth within each three-year period can be measured as the correlation or covariance of individual-specific mean incomes and individual-specific growth rates. This is measured quite apart from the inequality, volatility, and mobility risk discussed in the previous section, though it is clearly related to trends in these measures (see Jenkins and Van Kerm (2006) for fuller discussion of pro-poor growth). We show in Figure A-3 (online appendix) that pro-poor growth is the exception (at least for the time-period of 2001–2006); the correlation between income growth and income levels is negative only in France, Austria, and Italy. The regressive growth pattern that is the norm in these data results in the "fanning out" of individual income growth trajectories over time, as those with higher mean incomes experience faster income growth.

Volatility, on the other hand, is positively related to long-run incomes (Figure A-4, online appendix). Volatility therefore has a somewhat equalizing welfare effect because higher incomes (higher welfare) are more variable (lower welfare). The higher volatility of higher incomes is likely due to risky income sources producing higher mean returns; at any point in time, the richest individuals will tend to be realizing high returns from a volatile income source. Some of it also reflects the increased risk tolerance that wealthier individuals may have, if their basic needs are assuredly met, so they may gamble on stock market performance with the balance of their resources.[9]

7. Mobility versus Mobility Risk

The concept of mobility risk used in this paper is different from what has traditionally been called mobility, which concerns changes in the income distribution both in shape of the distribution over time and in reorderings of standings in the distribution. Sometimes mobility is decomposed into exchange and structural mobility as in Van Kerm (2004) and Ruiz-Castillo (2004). Exchange mobility refers to trading of income positions without changes in the share in each class while structural mobility allows shares in each class to change, which is related to the absolute and relative mobility distinction. The mobility risk measure we have used is agnostic about such distinctions; the variance of income growth rates can be higher with essentially no change in the income distribution over time (by assigning higher growth to lower income persons and negative growth to higher income persons, maximizing exchange volatility) or with essentially no change in rank but a change in the overall distribution (incomes growing more at the top, and shrinking at the bottom of the distribution).

Shorrocks (1978a) defined mobility in terms of reductions in an inequality measure, when extending the accounting period from one year to a longer period, by forming the ratio of longer period inequality to the weighted average of shorter-period inequality measures. This definition of mobility or a related one from

[9]Other work (Acs *et al.*, 2009; Hacker *et al.*, 2011) has documented a U-shaped pattern of variability in incomes, with individuals with very low or very high income exhibiting the highest rates of period-to-period changes in income.

Maasoumi and Zandvakili (1986) is used in many subsequent articles, for example Burkhauser and Poupore (1997), Maasoumi and Trede (2001), and Kopczuk *et al.* (2010).

Beginning with Ginsberg (1929), many authors have produced transition matrix measures of mobility in social standing (occupational class, position in the income distribution, or other measures). Prais (1955) used cross-generational data from Glass (1954) to illuminate the behavior and import of the structure of these transition matrices. Guilbaud (1977) clarified the estimation of these transition matrices, and Shorrocks (1976) explored the properties of the transition matrix approach applied to changes in annual income within a single generation. Shorrocks (1978b) proposed a measure of mobility based on transition matrices, generating a literature on matrix-based mobility measures, notably including work on ordering due to Dardanoni (1993).

We compare estimates of income mobility using a variety of existing measures and the measure of mobility risk defined in this paper. In particular, estimates of six mobility measures are displayed in Figure A-5 (online appendix): M = mobility risk, as defined in this article; R = ratio measure; T = Trace measure; D = Determinant measure; E = Eigenvalue measure; and C = Mean crossing measure.[10] We standardize each measure (subtracting the means and dividing by the sample standard deviations) since the measures have different intrinsic scales. Each of the standardized measures accords reasonably well with our measure of mobility risk, as demonstrated by the preponderance of standardized measures that follow an upward sloping line in Figure A-5, where countries are ordered by their estimated mobility risk.

In general, countries with higher year-to-year transition matrix-based mobility or greater reductions in inequality due to longer accounting periods also tend to have more variable income growth rates. Transition matrix-based mobility measures, reductions in inequality due to longer accounting periods, and the variation in individual specific trends (what we call mobility risk) measure very different notions of mobility. But the resultant estimates are strongly correlated, indicating that the different notions of mobility may all reflect a common element of income mobility, at least as measured as differences across countries. Only Korea and the United States stand out in exhibiting high mobility risk (variation in income growth rates) but low mobility by other measures.[11]

[10]R: The ratio measure (R) is calculated as the reduction in inequality when extending the accounting period from one year to a longer period, by forming the ratio of longer-period inequality to the weighted average of shorter-period inequality measures as in Shorrocks (1978a). T, D, E, and C are common matrix-based index measures of mobility for an $m \cdot m$ transition matrix M, namely: T = Trace measure: $[m - \text{Tr}(M)]/(m - 1)$, due to Shorrocks (1978b); D = Determinant measure: $\det(M)/(m - 1)$, due to Shorrocks (1978b); E = Eigenvalue measure: one minus the modulus of the second largest eigenvalue of M, due to Sommers and Conlisk (1979); and C = Mean crossing measure: the sum over i and j (from 1 to m) of M_{ij} times $|i - j|$ divided by $m(m - 1)$, due to Bartholomew (1973).

[11]While this broad agreement in disparate mobility measures is surprising, it is not unprecedented. Bayaz-Ozturk *et al.* (2011) also compare the Shorrocks (1978a) measure of mobility based on period-length inequality reductions and the Gangl (2005) measure, which is similar to ours but measures variance in log incomes, in both Germany and the United States during the 1990s, and find little substantive difference in mobility rankings based on the two very different measures. Using some of the same data we use, Van Kerm and Pi Alperin (2010) find broad agreement across a different set of mobility measures with various theoretical underpinnings.

8. Conclusions

The decomposition of variability in income across people and time undertaken here produces remarkably stable results across a variety of specifications. Calling total variability in incomes across people and time—measured as half the squared coefficient of variation—a measure of total income risk **R**, it can be expressed as the sum of "long-run inequality" **I** (a measure of income risk from behind the veil of ignorance[12]), variability around trend or "volatility" **V** measured as short-run fluctuations around a person-specific time trend, and variation in time trends or "mobility risk" **M**. Other measures of income mobility are empirically broadly consistent with the measure we call mobility risk, though there is no *a priori* reason they need be consistent.

All of the results indicate that long-run inequality is the dominant form of net income risk in these data. In the U.S., all forms of net income risk appear to be increasing sharply over time, and more modest growth in risk is observed in Canada and Germany. Other countries do not have sufficient data to conclude much about trends, but most other countries have lower levels of net income risk than the level observed in the U.S. The differences between the U.S. and other countries are much less stark when examining gross income risk, suggesting that the tax and transfer system of the U.S. has done less to mitigate increases in gross income risk than other countries' systems.

Reductions in long-run inequality can be achieved via a more progressive tax and transfer system, but reductions in volatility and mobility risk (comparing gross and net income estimates) can also be due to the overall progressivity of the tax and transfer systems, since an expectedly low income or declining income can be offset by tax reductions or transfer increases. Policies can be also directed at specific components of income risk. For example, a transfer program that insures income against unexpected losses, such as unemployment insurance, will tend to reduce volatility of incomes more than it reduces long-run inequality. Transfer programs that condition on low assets and low income will tend to benefit the chronically low-income, affecting long-run inequality more than volatility and mobility risk. Progressive taxation will reduce risk in long-run inequality, volatility, and mobility risk, but progressive taxation combined with income averaging (Batchelder 2003) will reduce volatility and mobility risk more than long-run inequality.

Tax and transfer policies can also influence market income risk, which in turn could offset some of the impact of tax and transfer policies on net income risk. For example, when wage constraints affect employment, greater availability of insurance causes higher aggregate risk via moral hazard effects, or the incidence of labor income tax or subsidy is borne only partly by the worker so that a wage subsidy lowers pretax wages (Eissa and Nichols, 2005; Rothstein, 2010). Future work should identify the contributions to inequality, volatility, and mobility risk of specific tax and transfer policies and other important factors such as trade competition, immigration, and the influence of politics.

[12]On the veil of ignorance see Harsanyi (1953, 1955) and Rawls (1971).

We can, however, draw some broad conclusions about the performance of the tax and transfer policies taken as a whole that constitute the main levers by which the modern welfare state affects the relative well-beings of its citizens. It is often said that welfare states are all about reducing risks (Goodin, 1990; Barr, 2001), yet so far little is known about how they perform in this regard. This article shows that, indeed, welfare states succeed in risk mitigation. However, they do so to varying degrees.

The U.S. stands out because of its particularly low levels of risk reduction, given its levels of overall economic development. The performance of the U.S. in terms of reducing market risk is comparable to the debtor nations of Greece and Portugal, the struggling economies of the Baltic states of Estonia, Latvia, and Lithuania, and Korea, where "discontent is rising both about inequality and about the role of the *chaebol*, producing growing disenchantment with both main political parties" (*Economist*, 2011), due to increasing inequality following the 1997 Asian financial crisis (An and Bosworth, 2013).

The Scandinavian countries of Sweden, Denmark, and Norway stand out at the other end of the spectrum, reducing income risk more than other comparable countries. Canada and Great Britain are perhaps interesting comparison cases for the U.S., in that they have similar populations and economies and levels of market income risk, and had comparable increases in top income shares (OECD, 2011), yet had dramatically lower net income risk. Great Britain even saw slowly falling net income risks during the 1990s and 2000s. Since we do not disaggregate the effect of policies here, we cannot point to a specific tax or transfer policy as a culprit, but it is interesting to note that effective marginal tax rates remained stable in Canada and Great Britain over the 2000 to 2006 period, while they were twice cut drastically in the U.S. (OECD, 2013).

An important but neglected feature of the welfare states examined here is the very large in-kind transfers of education and health care, which we do not measure as annual tax and transfer payments. The in-kind benefits transferred by public education and government-provided health insurance may dramatically reduce long-run inequality, volatility, and mobility risk in well-being. However, we suspect that the U.S. is again an outlier, with more private funding of, and inequalities in, education and health care (Devaux and de Looper, 2012) than comparable developed economies. However, the U.S. health care reform begun in 2010 and increasing reliance on charter schools may result in large changes in the distribution of in-kind transfers of education and health care over the coming decade.

Whatever these future trends, it is clear that countries differ systematically and substantially in the level of income risk experienced by their citizens. We have not explored possible causes of these differences at the individual and societal level, but two clear conclusions emerge. First, taxes and transfers matter; many countries greatly reduce all three forms of income risk through their tax system and the public benefits those taxes fund. Second, the United States is an outlier, with much higher income risk after taxes and transfers are taken into account. Explaining why countries vary so much in income risk and why the United States appears so distinctive presents a compelling research agenda for future research.

References

Acs, G., P. Loprest, and A. Nichols, "Risk and Recovery: Understanding the Changing Risks to Family Incomes," Low-Income Working Families Paper, 14, 2009 (http://www.urban.org/uploadedpdf/411971_risk_and_recovery.pdf).

An, C. and B. Bosworth, *Income Inequality in Korea: An Analysis of Trends, Causes, and Answers*, Harvard University, Cambridge, MA, 2013.

Autor, D. H., L. F. Katz, and M. S. Kearney, "The Polarization of the U.S. Labor Market," *American Economic Review*, 96(2), 189–94, 2006.

Autor, D. H., D. Dorn, and G. H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," NBER Working Paper No. 18054, National Bureau of Economic Research, Cambridge, MA, 2011.

Baker, M., "Growth-Rate Heterogeneity and the Covariance Structure of Life-Cycle Earnings," *Journal of Labor Economics*, 15(2), 338–75, 1997.

Barr, N., *The Welfare State as Piggy Bank*, Oxford University Press, Oxford, 2001.

Bartels, C. and T. Bönke, "German Male Income Volatility 1984 to 2008: Trends in Permanent and Transitory Income Components and the Role of the Welfare State," DIW-Berlin SOEP Working Papers No. 325, 2010.

Bartholomew, D. J., *Stochastic Models for Social Processes*, 2nd edn, Wiley, London, 1973.

Batchelder, L. L., "Taxing the Poor: Income Averaging Reconsidered," *Harvard Journal on Legislation*, 40, 395–452, 2003.

Bayaz-Ozturk, G., R. V. Burkhauser, and K. Couch, "Different Directions: Economic Mobility in the Western States of Germany and the U.S. from 1984–2006," Cornell University Working Paper, 2011 (http://www.human.cornell.edu/pam/research/centers-programs/german-panel/upload/Changing-Mobility-Bayaz-Burkhauser-Couch-September-2011_TSR.pdf).

Borjas, G. J., "The Relationship between Wages and Weekly Hours of Work: The Role of Division Bias," *Journal of Human Resources*, 15(3), 409–23, 1980.

Burkhauser, R. V. and J. G. Poupore, "A Cross-National Comparison of Permanent Inequality in the United States and Germany," *Review of Economics and Statistics*, 79(1), 10–17, 1997.

Burkhauser, R. V., J. Larrimore, and K. I. Simon, "A 'Second Opinion' on the Economic Health of the American Middle Class." NBER Working Paper No. 17164, National Bureau of Economic Research, Cambridge, MA, 2011.

Dardanoni, V., "On Measuring Social Mobility," *Journal of Economic Theory*, 61(2), 372–394, 1993.

Devaux, M. and M. de Looper, "Income-Related Inequalities in Health Service Utilisation in 19 OECD Countries, 2008–2009," *OECD Health Working Papers*, 58, Paris, OECD Publishing, 2012. [http://dx.doi.org/10.1787/5k95xd6stnxt-en]

Economist, "South Korea's Economy: What Do You Do when You Reach the Top?" November 12, 2011.

Eissa, N. and A. Nichols, "Tax-Transfer Policy and Labor-Market Outcomes," *American Economic Review*, 95(2), 88–93, 2005.

Friedman, M., *Capitalism and Freedom*, University of Chicago Press, Chicago, IL, 1962.

Gangl, M., "Income Inequality, Permanent Incomes, and Income Dynamics. Comparing Europe to the United States," *Work and Occupations*, 32(2), 140–62, 2005.

Ginsberg, M., "Interchange between Social Classes," *Economic Journal*, 39(156), 554–65, 1929.

Glass, D. V., *Social Mobility in Britain*, Routledge & Kegan Paul, 1954.

Gottschalk, P. and R. A. Moffitt, "The Growth of Earnings Instability in the U.S. Labor Market," *Brookings Papers on Economic Activity*, 2, 217–72, 1994.

———, "The Rising Instability of U.S. Earnings," *Journal of Economic Perspectives*, 23(4), 3–24, 2009.

Goodin, R. E., "Stabilizing Expectations: The Role of Earnings-Related Benefits in Social Welfare Policy," *Ethics*, 100(3), 530–53, 1990.

Guilbaud, O., "Estimating the Probability Eigenvector and Related Characteristics of an Ergodic Transition Matrix," *Scandinavian Journal of Statistics*, 4(3), 97–104, 1977.

Hacker, J., G. A. Huber, A. Nichols, P. Rehm, and S. Craig, "Economic Insecurity and the Great Recession: Findings From the Economic Security Index," 2011 (http://economicsecurityindex.org/upload/media/ESI%20Full%20Report%202011.pdf).

Harsanyi, J. C., "Cardinal Utility in Welfare Economics and in the Theory of Risk-Taking," *Journal of Political Economy*, 61(5), 434–35, 1953.

———, "Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility," *Journal of Political Economy*, 63(4), 309–21, 1955.

Jenkins, S. and P. Van Kerm, "Trends in Income Inequality, Pro-Poor Income Growth, and Income Mobility," *Oxford Economic Papers*, 58(3), 531–48, 2006.

Kopczuk, W., E. Saez, and J. Song, "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937," *Quarterly Journal of Economics*, 125(1), 91–128, 2010.
Lillard, L. A. and R. J. Willis, "Dynamic Aspects of Earnings Mobility," *Econometrica*, 46(5), 985–1012, 1978.
Lindert, P. H., *Growing Public. Social Spending and Economic Growth Since the Eighteenth Century*, Cambridge University Press, Cambridge, MA, 2004.
Maasoumi, E. and M. Trede, "Comparing Income Mobility in Germany and the United States Using Generalized Entropy Mobility Measures," *Review of Economics and Statistics*, 83(3), 551–9, 2001.
Maasoumi, E. and S. Zandvakili, "A Class of Generalized Measures of Mobility with Applications," *Economics Letters*, 22(1), 97–102, 1986.
Meltzer, A. and S. Richard, "A Rational Theory of the Size of the Government," *Journal of Political Economy*, 89(5), 914–27, 1981.
Moffitt, R. A. and P. Gottschalk, "Trends in the Autocovariance Structure of Earnings in the U.S.: 1969–1987," Working Paper No. 355, Department of Economics, Johns Hopkins University, 1995 (http://www.econ.jhu.edu/people/moffitt/).
Nichols, A., "Trends in Income Inequality, Volatility, and Mobility Risk." IRISS Working Paper, 2008 (http://iriss.ceps.lu/documents/irisswp94.pdf).
———, "Income Inequality, Volatility, and Mobility Risk in China and the US," *China Economic Review*, 21(Supplement 1), S3–S11, 2010.
OECD, *Growing Unequal? Income Distribution and Poverty in OECD Countries*, OECD Publishing, 2008.
———, *Divided We Stand: Why Inequality Keeps Rising*, OECD Publishing, 2011.
———, "OECD Tax Database Table I.6" OECD Publishing, 2013 (http://www.oecd.org/ctp/tax-policy/Table%20I.6_Mar_2013.xlsx).
Piketty, T. and E. Saez, "Income Inequality in the United States, 1913–1998," *Quarterly Journal of Economics*, 118(1), 1–39, 2003.
Prais, S. J., "Measuring Social Mobility," *Journal of the Royal Statistical Society. Series A (General)*, 118(1), 56–66, 1955.
Rawls, J., *A Theory of Justice*, Harvard University Press, Cambridge, MA, 1971.
Rothstein, J., "Is the EITC as Good as an NIT? Conditional Cash Transfers and Tax Incidence," *American Economic Journal: Economic Policy*, 2(1), 177–208, 2010.
Ruiz-Castillo, J., "The Measurement of Structural and Exchange Mobility," *Journal of Economic Inequality*, 2(3), 219–228, 2004.
Schumpeter, J., *Imperialism and Social Classes*, New York, Meridian Books, 1955.
Shin, D. and G. Solon, "Trends in Men's Earnings Volatility: What Does the Panel Study of Income Dynamics Show?" *Journal of Public Economics*, 95(7), 973–82, 2010.
Shorrocks, A. F., "Income Mobility and the Markov Assumption," *Economic Journal*, 86(343), 566–78, 1976.
———, "Income Inequality and Income Mobility," *Journal of Economic Theory*, 19(2), 376–93, 1978a.
———, "The Measurement of Mobility," *Econometrica*, 46(5), 1013–24, 1978b.
———, "Inequality Decomposition by Population Subgroups," *Econometrica*, 52(6), 1369–85, 1984.
Sommers, P. M. and J. Conlisk. "Eigenvalue Immobility Measures for Markov Chains," *Journal of Mathematical Sociology*, 6(2), 253–76, 1979.
Van Kerm, P., "What Lies Behind Income Mobility? Reranking and Distributional Change in Belgium, Western Germany and the USA," *Economica*, 71(282), 223–39, 2004.
Van Kerm, P. and M. N. Pi Alperin, "Inequality, Growth and Mobility: The Inter-Temporal Distribution of Income in European Countries 2003–2007," Methodologies and Working Papers Series KS-RA-11-003-EN-N, Eurostat, Luxembourg, 2010.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Online Appendix: Details on Income Variables
Figure A-1: Net income measures of income risk components in 30 countries, 2001–2006
Figure A-2: Gross income measures of income risk components in 30 countries, early 2000's
Figure A-3: Regressivity of income growth in 30 countries
Figure A-4: Progressivity of income variability around trend in 30 countries
Figure A-5: Comparison of alternative mobility measures across countries