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TRENDS IN INCOME INEQUALITY, PRO-POOR INCOME GROWTH AND INCOME MOBILITY

by

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Trends in income inequality, pro-poor income growth and income mobility[1]

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Abstract

We provide an analytical framework within which changes in income inequality over time are related to the pattern of income growth across the income range, and the reshuffling of individuals in the income pecking order. We use it to explain how it was possible both for 'the poor' to have fared badly relatively to 'the rich' in the USA during the 1980s (when income inequality grew substantially), and also for income growth to have been pro-poor. Income growth was also pro-poor in Western Germany, more so than in the USA, and inequality did not rise as much.

Keywords: inequality; income growth; income mobility; pro-poor growth; reranking

JEL Classification: D31; I32

1 Introduction

Not only is the inequality of family income higher in the USA than most other western developed nations (Atkinson et al. 1995), but also US inequality grew comparatively faster during the 1980s (see for example Gottschalk & Smeeding 1997). Descriptions of the US experience typically emphasize that income growth was greater for the rich than for the poor. For example, Danziger & Gottschalk (1995, Figure 3.3) have shown that the income of a family at the eightieth percentile rose sharply during the 1980s, whereas the income of a family at the twentieth percentile hardly changed at all over the same period, or fell slightly. (See also Gottschalk & Smeeding (1997, Table 3) or Karoly (1993).) At the same time, there has also been a growing literature about the longitudinal mobility of incomes in the USA, and several recent studies have found that mobility is lower than in Germany: see, for example, Burkhauser & Poupore (1997) and Maasoumi & Trede (2001). The three facets of the income distribution – inequality trends, differential income growth, and income mobility – have rarely been studied jointly, however. We do so in this paper. We provide a framework in which changes in income inequality over time are related to the pattern of income growth across the income range and the reshuffling of individuals in the income pecking order, and use it to analyze the US experience and to compare it with Germany's.

We show that when income inequality is measured using any member of the generalized Gini class of indices, the change in inequality between two points in time can be additively decomposed into two components, one summarizing mobility in the form of reranking, and one sumarising progressivity in income growth (i.e. whether income growth is pro-poor rather than pro-rich). This decomposition framework is used to reassess US income inequality trends during the 1980s, and to explain a potential paradox. That is, it is possible both for 'the poor' to have fared badly relatively to 'the rich' – the conventional picture of the USA during the 1980s derived from analysis of surveys like the Current Population Survey – and also for income growth to have been pro-poor. Income growth was pro-poor in Western Germany as well, and to a greater extent than in the USA. This, combined with less reranking than in the USA, underlay the relatively small rise in income inequality in Western Germany during the 1980s and 1990s.

Our inequality change decomposition is similar in spirit to the decompositions of poverty trends that are popular in development economics. For example, Datt & Ravallion (1992) have shown how a change in poverty over time

may be decomposed into growth and distribution components. See also Kakwani (1993, 2000) and Tsui (1996). More recently, Ravallion & Chen (2003) have developed a measure of pro-poor income growth that is directly related to changes in the Watts poverty index. Xu & Osberg (2002) showed that the proportionate change in the Sen-Shorrocks-Thon poverty index is related to proportionate changes in the proportion poor, growth in mean income among the poor, and changes in inequality of poverty gaps.[1]

A key element of our framework is that we track income changes for *individuals*, rather than income changes for income groups such as 'the poor' or in a reference income such as the bottom quintile or the mean income among the poor. (It is the latter changes that have been tracked in most of the literature on poverty and inequality trends.) The composition of the group who are poor changes over time because some individuals fall into poverty and some escape it. Average income growth between 1980 and 1990, say, among those who were poor in 1980 need not equal average income growth over the decade for those who were poor in 1990. Similarly, the individuals with a 1980 income equal to the poorest quintile in 1980 would have experienced a diversity of income growth rates, and few of these individuals would be likely to have a 1990 income equal to the poorest 1990 quintile. Put another way, analysis of income distribution trends using cross-sectional data sets ignores the reshuffling of individuals in the income distribution over time, whereas this mobility is an integral part of our approach.[2]

Our decomposition approach requires information about the joint distribution of income at two points in time. The emphasis on the joint distribution is also shared by the literature on the social welfare evaluation of multi-period income streams, in which the leading studies include Atkinson & Bourguignon (1982), Gottschalk & Spolaore (2002), and Bourguignon & Chakravarty (2003). In our approach, the social welfare evaluation refers to the marginal distribution of income, and we provide an accounting framework for analysis of changes in cross-sectional evaluations – as the poverty change decomposition literature also does.

This paper uses methods developed in the tax progressivity measurement literature. So too have Bénabou & Ok (2001), who argued that '(desirable) mobility *is* progressivity, in the mapping between initial incomes and future

[1] This type of decomposition, as well as ours, should not be confused with the decomposition of poverty and inequality indices by population subgroup or by factor component. About these, see *inter alia* Shorrocks (1982, 1984) or, for applications, Jenkins (1995).

[2] In the concluding section we indicate how our approach may be incorporated into poverty change decompositions.

opportunities' (2001, p. 1, emphasis in original), but our approach differs from theirs. Their focus was on the measurement of mobility between an initial income distribution and a conditional expected distribution. By contrast, we provide a decomposition of the change in the inequality of actual realized incomes into progressivity and mobility components. Mobility is associated with changes in ranking along the income scale, as it has also has been in many previous studies: see, *inter alia*, King (1983) or Yitzhaki & Wodon (2002). Note too the common practice of summarizing mobility using quantile transition matrices.[3]

The decomposition of inequality change is derived in Section 2. Section 3 contains a substantive application of the methods, using them to analyze the experience of the USA during the 1980s, and to compare this with that of Western Germany. Section 4 provides a summary and conclusions.

2 The decomposition of inequality change

In this section, we show that the change in income inequality over time can be additively decomposed into terms representing the progressivity of income growth and the extent of reranking. We measure inequality using members of the generalized Gini (or single parameter Gini, S-Gini for short) class of indices (Donaldson & Weymark 1980, Donaldson & Weymark 1983, Yitzhaki 1983). The conventional Gini coefficient, perhaps the most commonly-used inequality index, is a member of this class, and other members incorporate different ethical judgements. The S-Gini coefficient for a given year can be written

$$G(\upsilon) = 1 - \int \left[\upsilon(1-p)^{\upsilon-1}\right] \frac{x}{\mu} f(x)dx, \ \upsilon > 1, \tag{1}$$

where $f(x)$ is the probability density function for income x, $p = F(x)$ is the corresponding cumulative distribution function, and μ is mean income (Donaldson & Weymark 1983).

The social evaluation underlying the S-Gini is a weighted average of each individual's relative income (income relative to the mean, x/μ), where the social weight, $w(p;\upsilon) = \upsilon(1-p)^{\upsilon-1} > 0$, is a decreasing function of the individual's rank in the income pecking order ($0 < p \leq 1$). The υ is an inequality aversion parameter. The Gini coefficient is $G(2)$. Values of $\upsilon > 2$ yield indices that give greater social weight to poorer individuals than the Gini

[3]For a survey of the many alternative approaches to measuring income mobility, see Fields & Ok (1999).

does, and values of $\upsilon < 2$ yield indices giving relatively lower social weight to them. Inequality according to the S-Gini is the difference between the social evaluation for the case when all incomes are equal and the social evaluation of actual relative incomes.[4] $G(\upsilon)$ ranges between zero (income equality) and one (maximal inequality).

Consider now the change in the S-Gini between some base year (0) and final year (1) for a fixed population of individuals. Letting $f(x_0, x_1)$ denote the joint probability density function of incomes in years 0 and 1, the change in $G(\upsilon)$ can be written

$$\begin{aligned} \Delta G(\upsilon) &\equiv G_1(\upsilon) - G_0(\upsilon) \\ &= -\int\int \left[\left(w\left(p_1; \upsilon\right) \frac{x_1}{\mu_1} \right) - \left(w\left(p_0; \upsilon\right) \frac{x_0}{\mu_0} \right) \right] f(x_0, x_1) dx_0 dx_1 \quad (2) \end{aligned}$$

where subscripts 0 and 1 identify the relevant year, and p_0 and p_1 are given by the marginal cumulative distribution functions. This expression makes it clear that there are two factors underlying a change in inequality: changes in individuals' relative incomes, and changes in their social weights (which depend on their ranks in the income distribution). These two types of changes may not be independent since a large increase in relative income will often be associated with an increase in rank and hence a reduction in social weight. Income changes and rank changes are not perfectly correlated, however. For example, a mean-preserving spread of incomes reduces the incomes of those with relative incomes less than one, and increase the incomes of those with relative incomes greater than one, but ranks are preserved. They are also preserved if all incomes change uniformly, whether in proportionate or absolute terms. Moreover, an individual's relative income may remain constant but her social weight change, because the relative incomes of other individuals change.

Manipulation of (2) leads to the decomposition underpinning the paper:

$$\Delta G(\upsilon) = R(\upsilon) - P(\upsilon) \quad (3)$$

[4] When there is complete equality, $x/\mu = 1$ for all x, and the social evaluation of incomes is $\int w(p; \upsilon) f(x) dx = 1$.

where

$$\begin{aligned} R(\upsilon) &= G_1(\upsilon) - C_1^0(\upsilon) \\ &= \int\int \left[w\left(p_0;\upsilon\right) - w\left(p_1;\upsilon\right)\right] \left(\frac{x_1}{\mu_1}\right) f(x_0, x_1) dx_0 dx_1, \qquad (4) \\ P(\upsilon) &= G_0(\upsilon) - C_1^0(\upsilon) \\ &= \int\int w\left(p_0;\upsilon\right) \left[\frac{x_1}{\mu_1} - \frac{x_0}{\mu_0}\right] f(x_0, x_1) dx_0 dx, \qquad (5) \end{aligned}$$

and where $C_1^0(\upsilon)$ is the generalized concentration coefficient for year 1 incomes calculated using year 0 rankings.[5] $R(\upsilon)$ can be interpreted as an index of mobility in the form of reranking, and $P(\upsilon)$ can be interpreted as a measure of the progressivity of income growth (as we explain shortly). Thus (3) states that inequality is reduced by progressive income growth unless more than offset by concomitant income mobility.

$P(\upsilon)$ is a social-weighted average of the changes in relative incomes between years 0 and 1, and summarizes the progressivity of income growth across the base year income distribution.[6] Clearly, when everyone experiences equiproportionate income growth, relative incomes remain constant, and $P(\upsilon) = 0$. To interpret the measure further, note that, if $\mu_1 \neq \mu_0$, $P(\upsilon)$ can be rewritten as

$$P(\upsilon) = \frac{\pi}{1+\pi} K(\upsilon) \qquad (6)$$

where $\pi = (\mu_1 - \mu_0)/\mu_0$ is the proportionate change in the average income of the population as a whole, and $K(\upsilon)$ is a generalized Kakwani (1977)-type index of progressivity summarizing the proportionality of individual income growth,

$$K(\upsilon) = \int\int w\left(p_0;\upsilon\right) \left[\frac{(x_1 - x_0)}{(\mu_1 - \mu_0)} - \frac{x_0}{\mu_0}\right] f(x_0, x_1) dx_0 dx_1. \qquad (7)$$

Proportionality refers here to the proportionality of individual income changes between years 0 and 1 with respect to the reference point of year 0 incomes. Income growth for an individual is positive if $x_1 > x_0$, and negative if $x_1 < x_0$.

Consider first the case when aggregate income growth is positive, $\pi > 0$.

[5] The properties of generalized concentration and Gini indices are reviewed by Lambert (2001).

[6] We are interested in directional change, *i.e.* how much aggregate inequality changes when going from some base year to some final year, with the base year social evaluation as the reference point. If, instead, one wanted to summarize and decompose changes using the final year social evaluation as the reference point, the decomposition can be straightforwardly rewritten.

Then $P(\upsilon) > 0$ if income growth is concentrated more among poorer individuals than richer individuals, a factor leading to lower inequality over time, other things being equal. We label this the 'pro-poor growth' case. By contrast, $P(\upsilon) < 0$ when income gains over time are more than proportionally concentrated among richer individuals than poorer ones, a factor tending to increase inequality over time, other things being equal. This is the case of regressive income growth. When aggregate income growth is negative, $\pi < 0$, then income growth is pro-poor if the income losses are concentrated more among richer individuals than among poorer ones ($K(\upsilon) < 0$). If $\pi = 0$ (and $K(\upsilon)$ is not defined), $P(\upsilon)$ is simply the weighted average of the proportionate change in each individual's income. $P(\upsilon)$ is bounded by $G_0(\upsilon) - 1$ (when the richest person in year 0 obtains all the income in year 1), and $G_0(\upsilon) + 1$ (when the poorest person in year 0 obtains all the income in year 1).

Reranking index $R(\upsilon)$ is a relative-income-weighted average of changes in social weights. Clearly, when there is no reranking, $R(\upsilon) = 0$. Otherwise, $R(\upsilon) > 0$, and has a maximum value equal to $2G_1(\upsilon)$ when income ranks are totally reversed (i.e. when $p_1 = 1 - p_0$), so that the poorest person in year 0 is the richest in year 1, the second poorest becomes the second richest, and so on. When $\upsilon = 2$, then $w(p_0; \upsilon) - w(p_1; \upsilon) = 2(p_1 - p_0)$, and $R(2)/G_1(2)$ is the 'M_{10} asymmetric Gini mobility index', a mobility index in its own right, whose desirable properties are discussed at length by Wodon (2001) and Yitzhaki & Wodon (2002). And this, in turn, has the same form as the Atkinson (1980)-Plotnick (1981) measure of horizontal inequity in the income tax.

The decomposition set out in (3) can also be represented graphically. Consider two Lorenz curves, for incomes in year 0 and in year 1, and a concentration curve for year 1 incomes based on the ranking of individuals by year 0 income.[7] Figure 1 shows the curves for the USA, taking 1981 as year 0 and 1986 as year 1. (Income definitions are provided in the next section.) The well-known increase in inequality over this period is represented by the clear outward shift in the Lorenz curve. Twice the area between the Lorenz curves for 1981 and 1986 is the change in the Gini coefficient, $\Delta G(2)$; with different values for υ, the differences between the curves at each p are aggregated differently to yield $\Delta G(\upsilon)$.

The change between the Lorenz curves can be broken down into two parts.

[7]The Lorenz curve for year 0 (1) is a graph of cumulative income share against cumulative population share, where individuals are ranked in ascending order of year 0 (1) income. The concentration curve for year 1 plots cumulative income share against cumulative population share, where individuals are ranked in ascending order of year 0 income. It lies nowhere below the Lorenz curve for year 1. See Lambert (2001).

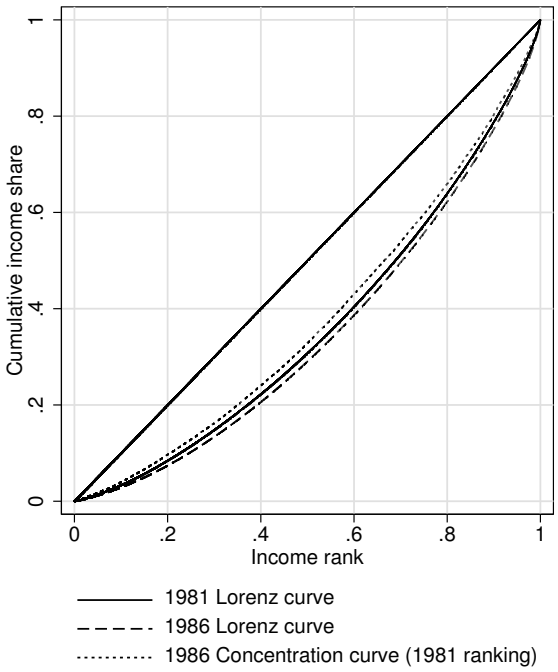

Figure 1: Decomposition of inequality change (USA, 1981-1986)

One is the difference between the Lorenz curve for 1981 incomes and the concentration curve for 1986 incomes constructed using 1981 income ranks. This summarizes the progressivity of income growth: $-P(2)$ is twice the area between these two curves. The second component is the difference between the concentration curve and the Lorenz curve for 1986, which summarizes the extent of reranking: $R(2)$ is twice the area between these two curves. In this illustration, individual income growth is clearly pro-poor, as the 1986 concentration curve lies everywhere above the Lorenz curve for 1981 incomes – but this inequality-reducing effect was more than offset by the effect of reranking. In general, the curves need not be configured in this way. The concentration curve may lie wholly below the base year Lorenz curve, in which case income growth is unambiguously regressive. Alternatively, it may have sections above and below the base year Lorenz curve, in which case it is not clear whether income growth is pro-poor or not. Conclusions based on summary indices may differ depending on the value of the inequality aversion parameter υ.[8]

[8]If there were no mobility, the concentration curve would coincide with the year 1 Lorenz curve, and $R(\upsilon) = 0$ and $P(\upsilon) < 0$. At the other extreme, were there a complete reversal of ranks, the concentration curve would lie to the left of the 45° line, symmetric to the year 1 Lorenz curve, with both $R(\upsilon)$ and $P(\upsilon)$ maximized. If year 1 ranks were independent of year 0 income rank, the concentration curve would coincide with the 45° line, with $R(\upsilon) > 0$ and $P(\upsilon) > 0$.

3 Decompositions of inequality change: the USA and Western Germany

We now apply our decomposition framework to study the changes in income inequality in the USA and Western Germany during the 1980s and 1990s. Not only are there suitable and comparable long-run panel data available for both countries, but also the USA and Germany provide a marked contrast in inequality trends. Income inequality increased substantially in the USA during the 1980s, but by much less in Germany (see for example Gottschalk & Smeeding 1997). Much less is known about the underlying patterns of income change, however. For example, was the large inequality rise in the USA largely due to regressive income growth? Or were there also notable changes in the income ranking? Does the small inequality rise in Western Germany reflect a pattern of significant reranking being offset by progressive income growth, or simply few income changes at all? If it is the first case, how does reranking in Western Germany compare with reranking in the USA, and so on?

We provide answers to these questions using income data from the US Panel Study on Income Dynamics (PSID) and the German Socio-Economic Panel (GSOEP), as released in a cross-nationally comparable format in the 'Cross-National Equivalent File 1980-2000' (Burkhauser et al. 2001).[9] Our data for the USA refer to the period 1980–1993 (1980 is the first year of PSID data in the CNEF; 1993 is the latest year of final release income data from the PSID).[10] The German data begin in 1984, the first year of the GSOEP, and exclude observations from Eastern Germany, as this sample was added only at the beginning of the 1990s.

The measure of income for each individual is based on the post-tax post-transfer annual income of the household to which they belong, adjusted for differences in household size and composition using the 'modified OECD' equivalence scale.[11] Each person's annual income was then averaged over a three-year period in order to minimize the contamination of our estimates by transitory

[9] See the CNEF web-site for details: `http://www.human.cornell.edu/pam/gsoep/equivfil.cfm`. The CNEF data were also used by Burkhauser & Poupore (1997) and Maasoumi & Trede (2001).

[10] The early release PSID data contain a not insubstantial number of households with suspiciously low values for household social security income, and others with suspiciously large amounts of government transfer income. Calculations using the early release data led to a clear but implausible break point in trends relative to earlier years.

[11] This equivalence scale, widely used in Europe and recommended by, for example, Atkinson et al. (2002), is defined for each household as equal to 1 + 0.5*(#adults – 1) + 0.3*(#children).

income variation and measurement error: an individual's 'income' for year t is equal to the arithmetic average of annual income for years $t-1$, t, and $t+1$. (The same procedure was adopted by Gottschalk & Danziger (2001).)

The decompositions of inequality change refer to changes over successive five year periods. For the USA, there are eight decompositions, referring to 1981–1986, 1982–1987, ..., 1988–1993. For Germany, there are ten decompositions, referring to 1985–1990, ..., 1994–1999.[12] All calculations used sample weights and, to eliminate the influence of outliers, the data were trimmed. We dropped observations with zero and negative incomes from all samples. Sample-specific outliers were also excluded in each decomposition.[13] Standard errors for all statistics were obtained using bootstrap resampling methods that adjusted for the correlation of income within households and between panel interviews (see Shao & Tu 1995, Horowitz 2001, Biewen 2002). The analysis was repeated using values for the inequality-aversion parameter υ spanning the interval $[1.5, 4]$ but, as the general conclusions were the same for each case, we report results only for the Gini coefficient, $G(2)$. (Results for the other indices are available from the authors on request.) In each of the decompositions undertaken, $\pi > 0$.

Table 1 shows the estimates of the inequality change decompositions for the USA. Inequality rose by more than two percentage points over each of the five-year periods considered. (There are differences in the point estimates of inequality change, but their 95% confidence intervals overlap substantially.) The largest change was for 1981–1986 (the case illustrated in Figure 1), when the Gini coefficient rose by 2.6 percentage points from 0.277 to 0.303. There is a consistent pattern to the decompositions too.

We find that income growth over each five-year period was progressive: $P(2) > 0$ in each case. That is, income growth was pro-poor – proportionately greater for the relatively poor than for the relatively rich. At first glance, this finding conflicts with the 'well-known' result that income growth was greater for the rich than for the poor in the USA in the 1980s. (See for example, Danziger & Gottschalk (1995, Figure 3.3), Gottschalk & Smeeding (1997, Table

[12] Calculations based on annual incomes and year-on-year changes in inequality are available from the authors on request.

[13] For each pair of years analyzed, we discarded an observation if the Mahalanobis distance between its two log-income values exceeded a critical value equal to the third quartile of the distribution of Mahalanobis distances in the two-year sample plus ten times the inter-quartile range. (This distance concept identifies not only outlier incomes in each year but also outlier changes in income between years.) Between 0.4 and 2.6 percent of US sample observations were excluded (depending on the survey years), and between 1.1 and 4 percent of Western German ones.

3) or Karoly (1993).) However the apparent differences between these findings and ours can be reconciled straightforwardly.

Table 1: Decomposition of changes in income inequality, USA, 1981-1992

Initial year	Final year	Initial Gini (1)	Final Gini (2)	Change in Gini, $\Delta G(2)$ (3)	Reranking, $R(2)$ (4)	Progressivity, $P(2)$ (5)
1981	1986	277	303	26.2	60	33
		(4.2)	(4.5)	(4.3)	(1.9)	(4.2)
1982	1987	282	308	25.4	59	34
		(4.4)	(6.8)	(5.0)	(2.0)	(5.5)
1983	1988	288	311	23.0	60	37
		(4.5)	(5.0)	(3.7)	(2.1)	(4.0)
1984	1989	293	319	25.8	59	33
		(3.8)	(5.7)	(4.3)	(2.0)	(5.1)
1985	1990	300	323	23.4	59	35
		(4.4)	(6.1)	(4.8)	(1.9)	(5.4)
1986	1991	302	327	25.0	56	31
		(4.7)	(6.5)	(4.3)	(1.8)	(4.8)
1987	1992	304	324	20.6	57	37
		(4.5)	(5.7)	(4.0)	(1.9)	(4.4)

Notes: Estimates have been multiplied by 1000 and rounded. Bootstrap standard errors are shown in parentheses. Income is defined in the text. Source: authors' calculations from the Panel Study of Income Dynamics (Cross-National Equivalent File release).

Over the 1980s there was substantial reshuffling of positions in the US income distribution. The person with a family income at the twentieth percentile in 1981 (say) was unlikely to be the person at the twentieth percentile in 1986. With pro-poor income growth, a number of individuals who were poor in the initial year moved out of low income, but were replaced at the bottom of the income distribution by individuals who were non-poor initially and who had lower incomes (on average) in the final year of the period than those whom they replaced. Put more generally, at the same time as when inequality in each cross-section was rising, there were changes in membership of the poor, middle-income and rich groups. Studies taking a cross-sectional perspective calculate average income changes for various income groups without taking account of these changes in membership. By constrast, we calculate income changes for groups with a fixed income group membership (defined by initial income position), and add in a separate term to account for changing income group membership over time.[14] More specifically, we see from Table 1 that the

[14]When we treated our PSID data as a series of separate cross-sections, we found that income changes for different income groups took the same patterns as those described in the studies cited earlier.

reranking index $R(2)$ was almost double the magnitude of the progressivity index $P(2)$ for each of the five-year periods considered. Clearly, in 1980s USA, the equalizing effect of progressive income growth was more than offset by the disequalizing effect of reranking.

Were these patterns mimicked in Western Germany? We find both similarities and differences: see Table 2. Income inequality was significantly lower than in the USA throughout the period: for example in 1987 the German Gini was 0.223 compared to 0.304 in the USA. Inequality grew during the 1980s in Germany, as it did in the USA, but at a rate that was generally smaller than in the USA (even when measured in percentage change terms), and tailed off altogether during the 1990s. The decompositions of inequality change for Germany are similar to those for the USA in that income growth was also pro-poor. And, again as in the USA, there was substantial reranking. There is a notable difference in the patterns for the two countries, however. In Western Germany, the progressivity effect is relatively large. Although $R(2) > P(2)$ throughout the 1980s in Germany, it is greater only by a small amount and, as it happens, during the mid- to late-1990s, the components offset each other almost exactly (and inequality hardly changed).

The cross-national contrasts in the relative size of the pro-poor income growth contribution to inequality change are highlighted by Figure 2. To facilitate comparability, the estimates of $P(2)$ for each of the two countries have been normalized by inequality in the corresponding initial year, $G_0(2)$. Vertical bars show bootstrap pointwise 95 percent confidence bands. It can be seen that progressivity of income growth was significantly higher in Western Germany than in the USA for the periods when the series overlap. Had there been no reranking, and other things being equal, progressive income growth would have reduced inequality by about 21 percent in Western Germany, but only by about 11 percent in the USA.

Mobility, as measured by the normalized reranking index $R(2)/G_0(2)$, was also higher in Western Germany than in the USA: see Figure 3. This finding is consistent with those of earlier studies using data similar to ours: see for example Burkhauser & Poupore (1997) and Maasoumi & Trede (2001).[15] It is inconsistent, however, with the results of Formby et al. (2001) and Van Kerm (2003). The explanation for the differences in results is straightforward. As

[15]We also found that the difference in the extent of reranking between Germany and the USA was larger the greater the degree of inequality aversion (the larger the υ). This suggests that the key to understanding the cross-national mobility difference overall is the difference in mobility at the bottom of the income distribution. On this, see also Schluter & Trede (1999).

Table 2: Decomposition of changes in income inequality, Western Germany, 1985-1999

Initial year	Final year	Initial Gini (1)	Final Gini (2)	Change in Gini, $\Delta G(2)$ (3)	Reranking, $R(2)$ (4)	Progressivity, $P(2)$ (5)
1985	1990	219	227	8.2	59	50
		(4.2)	(4.2)	(3.5)	(2.4)	(4.0)
1986	1991	222	233	11.4	61	49
		(4.4)	(3.9)	(3.5)	(2.6)	(3.8)
1987	1992	223	237	13.4	60	47
		(4.5)	(4.3)	(3.3)	(2.5)	(3.8)
1988	1993	224	238	13.9	62	49
		(4.5)	(4.0)	(3.6)	(2.8)	(3.8)
1989	1994	225	239	14.6	59	44
		(4.3)	(4.3)	(3.8)	(2.5)	(4.1)
1990	1995	225	237	11.4	54	43
		(4.3)	(3.8)	(3.6)	(2.2)	(3.8)
1991	1996	232	236	3.8	54	50
		(5.0)	(4.5)	(3.8)	(2.7)	(4.4)
1992	1997	234	238	3.4	52	48
		(4.7)	(4.6)	(3.5)	(2.4)	(3.6)
1993	1998	243	241	-1.4	51	53
		(4.9)	(4.9)	(3.8)	(2.5)	(4.4)
1994	1999	243	242	-0.8	53	54
		(5.3)	(4.5)	(3.8)	(3.0)	(3.9)

Notes: Estimates have been multiplied by 1000 and rounded. Bootstrap standard errors are shown in parentheses. Income is defined in the text. Source: authors' calculations from the German Socio-Economic Panel (Cross-National Equivalent File release).

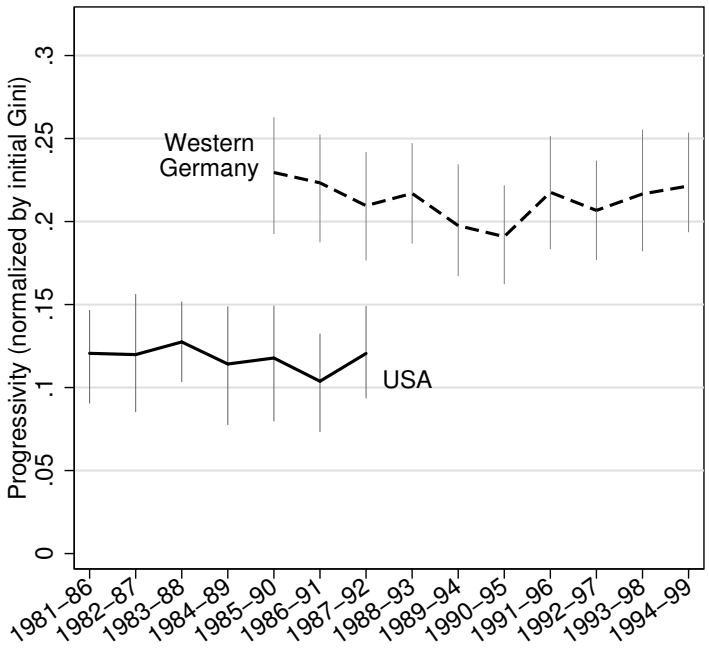

Figure 2: Income growth is more pro-poor in Western Germany than in the USA

Fields & Ok's (1999) survey article points out, 'the very concept of income mobility is not well-defined; different studies concentrate on different aspects of this multi-faceted concept' (1999, p. 557). The studies reporting higher mobility in Germany than in the USA used measures based either on reranking (as in this paper) or the extent to which inequality was reduced by an extension of the income-accounting period. The studies with the opposite finding measured mobility in terms of the average income change. That the different concepts of mobility lead to different conclusions is of course of interest in itself, and development of more detailed explanations of why they do is a worthy topic of further research, particularly since cross-national differences in income mobility are often related to differences in labour markets, social insurance, and social assistance.

4 Summary and conclusions

We have proposed a decomposition that links changes in inequality over time to the extent to which income growth is pro-poor and to the extent of income reranking. Analysis of inequality trends in the USA and in Germany using this framework suggests that, in both countries, income growth is pro-poor

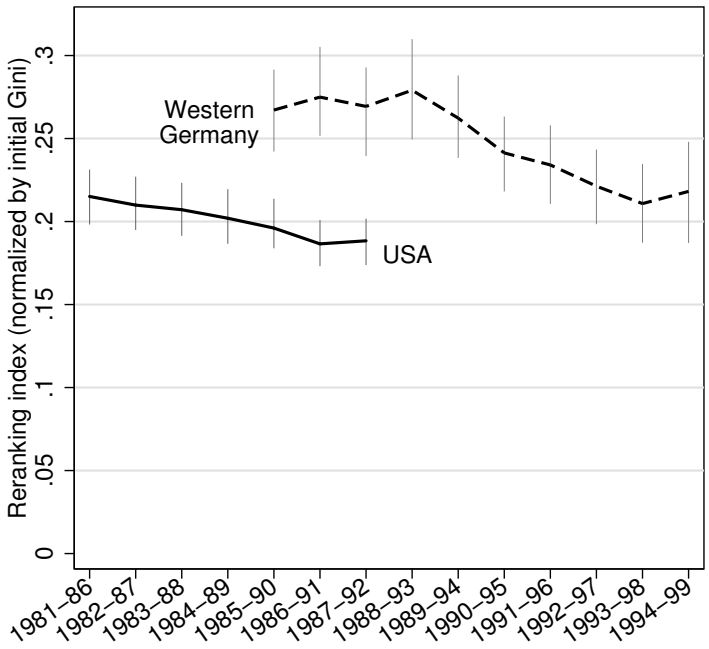

Figure 3: Reranking is greater in Western Germany than in the USA

and hence a force for inequality reduction, but this effect is typically offset by changes in the income pecking order that have a disequalizing impact. This latter effect was much larger in the USA in the 1980s than in Western Germany, and inequality rose faster in the former compared to the latter.

The findings underline that cross-sectional and longitudinal studies of the income distribution provide different (complementary) pictures of what happens over time. Our study builds on the fact that cross-sectional data cannot be used to track the experiences of a particular set of individuals over time – they track income groups, whose composition may change. This explains how it can be possible both for 'the poor' to fare badly relatively to 'the rich' and for income growth to be pro-poor.

Although we have focused on inequality change in our decompositions, analogous methods can also be developed for the decomposition of changes in poverty over time. As we pointed out in the Introduction, existing decompositions of poverty change take a cross-sectional perspective and implicitly ignore reranking. But they can be extended to incorporate these effects. For example, one can show that the change in the Watts poverty index between two years can be written in terms of the average income growth rate among those who were initially poor, a term summarizing the changes in income rank among the initially poor, and a term summarizing changes in the proportion

poor. Similarly, the change in the Sen-Shorrocks-Thon index can be decomposed into terms summarizing average income growth among those who were initially poor and changes over time in the composition of the poor group. More generally, whenever social evaluations – whether of inequality, poverty, or social welfare – are undertaken using measures that can be written as an average of the product of a rank-based social weight function and a function of income, then one can decompose the change over time in the social evaluation into terms related to progressivity of income growth and to reranking.

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