

How Has Income Inequality Grown? The Reshaping of the Income Distribution in LIS Countries\*

by

Arthur S. Alderson  
Kevin Doran  
Indiana University, Bloomington

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### Abstract

After situating contemporary trends in inequality in the context of global income inequality – and briefly reviewing accounts thereof – we turn to address the question, “Has the middle hollowed out?” We use data from the *Luxemburg Income Study* and methods based on the relative distribution to decompose overall distributional change into changes in location and shape. We do so for a heterogeneous group of countries: five transitional and middle-income societies – the Czech and Slovak Republics, Poland, Russia, and Taiwan – and four high-income societies – the U.K., U.S., Sweden, and Germany. In the U.K. and U.S., we also examine the changing position of households at interesting social locations (i.e., female-headed households and households whose heads and spouses/partners lack university qualifications). Focusing on changes in shape, we identify how income inequality has grown between LIS Waves I and VI.

## How Has Income Inequality Grown? The Reshaping of the Income Distribution in LIS Countries

At the outset of the Industrial Revolution, the world as a whole was – by current standards and metrics – quite poor, and most inequality in the world distribution of income was attributable to *within-nation* income differences. Over the next two centuries, a “Great Divergence” between “the West” and “the rest” occurred, one in which global inequality exploded (Pommerantz 2000). Simply put, for much of the last two centuries, some nations grew fantastically richer while the rest of the world remained poor, relatively and, in some cases, absolutely. Consequently, income differences between societies ballooned to dominate the world distribution of income. Today, if income inequality within countries were eliminated entirely, it is estimated that global inequality would be reduced by no more than a third (Gosling 2001; Milanovic 2002). At the turn of the millennium, however, a number of scholars began to report exciting results suggesting a break in the long-run trend toward rising global inequality (e.g., Shultz 1998; Firebaugh 1999; Sala-i-Martin 2002). Presently, our best estimates indicate that “true” global income inequality has either plateaued or declined in recent decades (cf., Firebaugh 2003; Milanovic 2005).

Why has the trend toward rising global income inequality moderated? The break in the trend is not attributable to declining within-nation inequality. As we detail below, the evidence suggests that income inequality has been *increasing* in the average society in recent years, not decreasing. Rather, it is due to declining inequality between nations. While a number of developments are involved, the most important factors, simply put, are China and India. In the last couple of decades, China and the societies of South Asia have experienced income growth that has been faster than the world average. This has meant that the average income in these societies -

which contain, of course, roughly 40% of the world's population – has shifted measurably toward the global average.

While there are a number of important addenda and qualifications that one would want to apply to this brief sketch of global income inequality (see Firebaugh 2003 and Milanovic 2005), we begin with this bit of historical context because we believe that is important to situate the recent developments in within-nation inequality discussed below in relation to global inequality. Our current understanding of global income inequality raises at least general points for thinking about within-nation income inequality: First, it means that within-nation inequality, which had been a declining component of global inequality for most of the last 200 years, is now a growing component. As Gosling (2001:745) describes the 1980s and 1990s, “the composition of world income inequality experienced a fundamental change, characterized by the diminishing significance of between-nation income differences and the growing prominence of within-nation inequalities.” Second, much of the scholarly debate over the dramatic developments in China and India, and over rising inequality in the Global North, has been informed by the discourse on globalization. This research on global income inequality reminds us, as we turn to consider within-nation inequality, that our assessments of the welfare consequences of globalization may vary considerably depending upon the scope of such assessments. For example, it is quite clear that recent developments in China and the U.S. are intimately intertwined (Hung 2009). In a very real sense, some fraction of the upswing in income inequality in the U.S. is the flip side of explosive growth in China that has likewise generated rapidly rising income inequality in China *and* moved tens of millions of people out of \$1 a day poverty in recent decades.

## TRENDS IN WITHIN-NATION INCOME INEQUALITY

The evidence indicates that inequality has been growing in the typical society in recent years. Cornia and Addison (2003), for instance, use the *World Income Inequality Database* to examine trends in inequality since WWII for the subset of countries for which the most reliable data are available. Focusing in particular on the last two decades of the 20<sup>th</sup> Century, they draw conclusions based on approximately 800 observations on 73 countries, accounting for about 80% of the world's population. The key finding is that inequality increased in about 2/3rds of the societies under study. It increased in most developed societies, in nearly half of the developing societies, and in nearly all transitional/post-communist societies. Cornia and Addison (2003) also find that, where it occurred, the upswing in inequality was substantively meaningful, being 5 Gini points or greater in most of the countries experiencing rising inequality.<sup>1</sup> Finally, the turn toward rising inequality appears to have accelerated over time, with more countries joining the set of countries experiencing rising inequality each year since the early 1980s.

These data suggest, again, that we are in the midst of an important shift in the landscape of global income inequality. One consequence has been the replacement of one iconic descriptor with another, as accounts of long-term trends in inequality have moved away from the image of an “inverted U” to a “U,” or from the Kuznets Curve (Kuznets 1955) to what has come to be called “The Great U-Turn” in the U.S. (Harrison and Bluestone 1988). Until a few decades ago, descriptions of historical trends were dominated by the familiar inverted U of the Kuznets Curve. Looking at a small handful of industrial societies in the middle of the last century, Kuznets thought he saw common features in their experience with inequality in the 19<sup>th</sup> and 20<sup>th</sup> centuries, suggesting

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<sup>1</sup>What does an increase of 5 Gini points mean substantively? In a two-person *cake sharing* game, an increase of 5 Gini points means that the person receiving the smaller slice at  $t$  would receive two and a half percent less cake at  $t+1$  (Subramanian 2002).

a systematic pattern in which inequality at first increased, reached a peak, and later declined in the course of economic development.

While the longitudinal implications of the Kuznets Curve for contemporary low- and middle-income societies has been a subject of regular and recurring debate (cf., Nielsen and Alderson 1995; Deininger and Squire 1998), it is quite clear at present that the industrial transition – the shift of the labor force out of agriculture and into industry and services that Kuznets saw as the central mechanism driving rising inequality in the early stages of industrial development – is rapidly drawing to a close. Indeed, in the contemporary period we have arrived at a situation in which – for the first time in at least 5,000 years – more people in the world work outside of the agricultural sector than within it. Moreover, according to the ILO (2009), at some point between 1998 and 2003, agriculture likewise ceased to be the modal sector of global employment, its share of employment being eclipsed by that of services. This suggests that the typical society in the world is now well beyond the point at which inequality owing to dualism between the agricultural and non-agricultural sectors should be producing rising inequality in developing countries.<sup>2</sup>

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In Figure 1, we illustrate these developments. In the first panel (upper left), we simply pool all observations available on income inequality in the world's societies in the early 1960s (i.e., 1960-1964) in the *World Income Inequality Database*. We plot this against a measure of economic development (i.e., real GDP per capita) and fit a quadratic. Unsurprisingly, the familiar inverted-U of the Kuznets Curve emerges in these data from the early 1960s. From low to middling levels of development, inequality increases on average. However, beyond some middling level of development, it turns to decline. Examining the same relationship across the 1970-74, 1980-84,

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<sup>2</sup> See, for instance, the simulations of sector dualism presented in Figure 2 in Nielsen (1994).

1990-94, and 2000-04 periods, one can note how the Kuznetsian pattern breaks down by the 1990s as the world societies shift to the right - as average income increases and as the industrial transition, on a global level, moves toward completion.

By the turn of the millennium, then, we had arrived at a situation in which rich countries tended to have lower inequality on average than poor countries, but also one in which the majority of countries, rich and poor, had moved onto a trajectory of rising inequality. As Figure 1 indicates, it seems unlikely that this phenomenon has been driven by the set of “classic” or “traditional” explanations of inequality oriented toward the problematic of the industrial transition. Moreover, the upswing that Cornia and Addison (2003) and others have documented first began among the most developed societies. It may have occurred first in the United States. Across the immediate post-WWII period, inequality was generally trending downward. Data published by the U.S. Census Bureau indicate that the Gini coefficient of family income inequality declined from 37.6 in 1947 to 34.8 in 1968. After 1968, family income inequality began to increase more or less monotonically and by 2008 had reached 43.8. The U.S. presently exhibits a level of income inequality that has not been observed since the late 1920s.

#### ACCOUNTS OF CONTEMPORARY WITHIN-NATION INEQUALITY

A variety of explanations have been offered to account for the rise in inequality. In other cross-national research, and research on trends in inequality in U.S. states and counties, we have worked to integrate three literatures that have emerged around this problematic. Our aim is to combine attention to factors affecting the distribution of wages and earnings – which have tended to be the concern of economists – with a focus on a range of institutional, demographic, and compositional factors that both shape the aggregation of wages and earnings into the distribution of

household and family income, and affect inequality in ways that are largely independent of the distribution of earnings. Given that we have reviewed these literatures in detail elsewhere (e.g., Moller, Alderson, and Nielsen 2009), we touch here on only the broadest outlines of each.

The first literature is centered in economics and takes as its object the simple fact of rising inequality. A central hypothesis is that wage inequality has risen in many societies because of skill-biased technological change. Technological advancements have increased demand for highly educated/skilled workers and this demand has outpaced supply and created scarcity rents for the highly-skilled (Levy and Murnane 1992; Autor, Katz, and Krueger 1998). The second literature, typically oriented toward cross-national comparison, takes as its object the persistent level differences in inequality between countries and regions, and the heterogeneous inequality experience of different countries and regions. Here one finds a diversity of arguments regarding the role of labor market institutions (e.g., centralized wage-setting, unionization), globalization (e.g., international trade, investment, and migration), and of the wave of domestic and international liberalization (e.g., Alderson and Nielsen 2002; Moller et al. 2003; Kenworthy and Pontusson 2005; Brady 2009). This research has cumulated to the extent that some scholars have begun to outline a “unified theory” that would explain recent trends in wage inequality, real wages, and unemployment across developed countries. It attributes recent inequality trends to the interplay of exogenous shocks – affecting labor supply and demand and the stability of earnings – with the marked differences in the institutional contexts of different countries and regions (Blank 1998; Blau and Kahn 2002; DiPrete et al. 2006). In this perspective, for instance, the effects of skill-biased technological change on inequality might vary substantially depending upon the institutional context. The third literature takes as its object household and family income inequality. While sharing many of the same concerns of the second (e.g., labor market institutions, globalization, etc.), this literature

is most distinctive in focusing, for instance, on how sociodemographic factors – the age distribution of the population, the composition of households, assortative mating, racial and ethnic cleavages – generate inequality among households and families that is independent of the distribution of wages and earnings (e.g., Cancian and Reed 2001; McCall 2001; Moller, Alderson and Nielsen 2009; Blau, Ferber, and Winkler 2010). In the case of the United States, for example, while household and family income inequality rose measurably across the 1970s, the upswing in earnings inequality did not take off until the 1980s. And during the 1980s and early 1990s (when earnings inequality was rising) change in earnings inequality explains only about a third of the change in family/household income inequality (Burtless 1999).

While research on the issues raised in these literatures has grown at a remarkable pace over the last two decades, it is useful to consider the fact that these explanations often imply very different patterns of distributional change, while predicting the same outcome in terms of the behavior of standard summary measures of inequality (e.g., a rise in the Gini coefficient or in the Theil index). Morris, Bernhardt, and Handcock (1994:206) noted this problem at the very outset of the revival of sociological and economic interest in income inequality, suggesting that “empirical investigation...has been handicapped by methods that are insensitive to [patterns of distributional change].” What is at issue? Consider, for instance, now-standard accounts of the effects of globalization on income inequality in the Global North. They often suggest that globalization is producing an increasingly *polarized* job distribution, a growing upper tier with high wages and security, a growing bottom tier in low-wage and insecure service positions, and a “shrinking” middle (e.g., Wood 1994). Other accounts, however, imply a rather different pattern of distributional change. The skill-biased technological change explanation touched on above suggests that inequality is rising as a result of *upgrading*; that is, growth in the upper tail of the distribution that has simply left

less skilled workers behind. Similarly, scholars who emphasize the effects of the growth of autocatalytic, “winner-take-all” markets describe a process in which various technological and institutional changes have combined to produce an expanding number of markets in which rewards are concentrated in the hands of a small number of “winners” (Frank and Cook (1995)<sup>3</sup> While these explanations, again, imply very different patterns of distributional change – and these patterns have distinct implications for policy and for distributive justice – these accounts of rising inequality effectively point to the same increase in summary inequality measures as *prima facie* evidence in support of their premises. As such – and in a world in which high-quality, comparable data on income are scarce – we believe it is useful to occasionally look “behind” the usual summary measures and closely examine the actual pattern of distributional change, attending to change at all points on the distribution and fully exploiting the available information. In short, it is important to examine how income inequality has grown.

In earlier research, we used the available high-quality data from the *Luxembourg Income Study* (LIS) to examine the experience of sixteen high-income societies across the period from the late 1960s to the turn of the century (Alderson, Beckfield, and Nielsen 2005). We next expanded our investigation to include seven transitional and middle-income societies (Alderson and Doran forthcoming). Most recently, we have updated our earlier analyses, taking advantage of the latest wave (Wave VI) of data from LIS and have begun to look at households in interesting social locations (i.e., female-headed households and households at different educational and skill levels). In investigating the inequality experience of these societies we seek to understand how inequality grew and to what extent the observed patterns of distributional change are heterogeneous or

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<sup>3</sup> In the case of the United States, Piketty and Saez (2003) document the explosive growth of the income share of the top 1% across the 1980s and 1990s. It nearly doubled, rising from 8% in 1980 to about 15% by 1998.

homogenous. In this paper, we present our latest results, especially as they speak to the organizing question of the panel: “Has the middle hollowed out?”

## RELATIVE DISTRIBUTION METHODS AND DATA

To address these questions, we use relative distribution methods. Developed by Handcock and Morris (1999), methods based on the relative distribution powerfully assist in the description of distributional change and enable counterfactual comparison of compositionally-adjusted distributions.<sup>4</sup> The basic idea underlying the relative distribution is quite simple; it is to take the values of one distribution – the comparison distribution – and express them as positions in another – the reference distribution. Imagine two distributions of household income, one measured at  $t$  and one at  $t+1$ . Treat that measured at  $t$  as the reference distribution and that measured at  $t+1$  as the comparison distribution. When there are no differences between the comparison and reference distributions, the *relative distribution* of the grade-transformed data will be uniform or “flat” (i.e., the proportion of households falling within given quantile cut points of the reference distribution,  $t$ , at  $t+1$  is the same as that at  $t$ ). When there are differences between comparison and reference distributions, the relative distribution will “rise” or “fall” (i.e., the proportion of households falling within given quantile cut points of the reference distribution,  $t$ , at  $t+1$  will be greater or less than that that at  $t$ ). In this fashion, then, one can distinguish between growth, stability, or decline at all points on the distribution.<sup>5</sup>

Another nice feature of these methods is that one can use the relative data to develop summary measures to characterize any pattern of change that one might be interested in exploring.

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<sup>4</sup> These techniques are very similar in spirit to those developed in economics by Juhn et al. (1993), Lemieux (2002), Machado and Mata (2005), and DiNardo et al. (1996).

<sup>5</sup> While introduced here – and illustrated below – in a non-technical fashion, see Handcock and Morris (1999; especially pp. 21-27) for a formal definition of the relative distribution.

Handcock and Morris (1999) themselves have developed a measure of polarization that captures the degree to which there is divergence from, or convergence toward, the center of the distribution, and is thus ideally suited to addressing the question of the “hollowing of the middle.” For quantile data  $Q$ , the *median relative polarization index* (MRP) takes the form (Morris, Bernhardt, and Handcock 1994:217):

$$\text{MRP}_t(Q) = \frac{4}{Q-2} \left| \frac{i - \frac{1}{2}}{Q} - \frac{1}{2} \right| X \left( g_t(i) - \frac{Q}{Q-2} \right),$$

where  $g_t(i)$  is the relative distribution – the proportion of year  $t$ 's households whose median-adjusted incomes fall between each pair of quantile cut points, divided by the proportion in the reference year,  $i = 1, 2, \dots, Q$ , and the adjustment by  $1/2$  establishes the mid-point for each quantile. The index varies between 1, -1 and 0. It takes the value of 0 when there has been no change in the distribution of household income relative to the reference year. Positive values signify relative polarization (i.e., growth in the tails of the distribution) and negative values signify relative convergence toward the center of the distribution (i.e., less polarization).

The median relative polarization index can be decomposed into the contributions to distributional change made by the segments of the distribution above and below the median (Handcock and Morris 1999), enabling one to distinguish “upgrading” from “downgrading.” For quantile data, the *lower relative polarization index* (LRP) and the *upper relative polarization index* (URP) are calculated as:

$$\text{LRP}_t/\text{URP}_t(Q) = \frac{8}{Q-2} \left| \frac{i - \frac{1}{2}}{Q} - \frac{1}{2} \right| X \left( g_t(i) - \frac{Q}{Q-2} \right).$$

They have the same theoretical range as the MRP and decompose the overall polarization index (Morris, Bernhardt, and Handcock 1994:209):  $\text{MRP}_t = \frac{1}{2} \text{LRP}_t + \frac{1}{2} \text{URP}_t$ .

We apply these techniques to data drawn from the *Luxembourg Income Study (LIS) Database* (2010). For each country/year involved in the analysis, we generate quantile boundaries for the distribution of household income (equivalent net disposable household income), adjusting for household size using a standard equivalence scale (i.e. the square root of the number of persons in the household).

--- FIGURE 2 ABOUT HERE ---

## RESULTS

To introduce the results and to illustrate our use of these methods, consider the case of the Czech Republic. Based on the Gini coefficient and other summary measures, we know that income inequality rose in the Czech Republic across the 1990s, but what exactly happened to the “middle” during the first few years of the transition from communism? In the upper panel of Figure 2 we present two probability density functions (PDF) of the Czech distribution of household income: The solid line, which we have labeled the reference year, is the distribution of household income in 1992. The PDF drawn with the dotted line, which we will treat as the comparison year, is the distribution in 1996. Examining these two distributions, we see that the reference or 1992 distribution has a slight right skew, while the comparison distribution has a larger median and variance.

As touched on above, the central idea informing relative distribution methods is to take the values of one distribution and express them as positions in another. To illustrate, consider the two vertical lines in the upper panel of Figure 2. The dotted line is drawn at the median of the 1996 distribution (approximately 6.8 ln kroner). The solid vertical line is drawn at the point where the 1992 and 1996 distributions intersect (approximately 6.5 ln kroner). Attending to the dotted line, take note of the density of the comparison or 1996 distribution,  $A_C$ , at this point (approximately 0.87) and of the density of the reference or 1992 distribution,  $A_R$ , at this same income (approximately 0.20). Attending to the solid line, take note as well of the density of the comparison and reference distributions,  $B_C$  and  $B_R$ , at this income (both approximately 0.74).

With this information, and across the response scale, one can form the *relative PDF*, which is simply the density ratio at each quantile. At the median of the 1996 distribution, the relative density is  $0.87/0.2 = 4.4$ . This is illustrated in the bottom panel of Figure 2: The relative density at point  $A_{RC}$  means that there were about 4.4 times more households at this point on the reference distribution in 1996, a point corresponding to the 95<sup>th</sup> percentile of the 1992 distribution. At the point where the two distributions intersect in the upper panel, the relative density is  $0.74/0.74 = 1$ . The relative density at point  $B_{RC}$  means that there were exactly as many households at this point of the reference distribution in 1996 as in 1992, a point corresponding to about the 81<sup>st</sup> percentile of the 1992 distribution. When the relative density is less than 1.0, there are fewer comparison observations at this point of the reference distribution (<81<sup>st</sup> percentile in the case at hand). When the relative density is greater than 1.0, there are more comparison observations at that point on the reference distribution (>81<sup>st</sup> percentile in the case at hand).

Returning again to the top panel of Figure 2, it is clear that there are two key differences between the 1992 and 1996 distributions of household income, differences that pertain to the first

two moments of the distribution. First, there is a change in location – the expected value shifts to the right over time. Second, there is a change in shape: the comparison distribution has greater variance than the reference distribution.

--- FIGURE 3 ABOUT HERE ---

When, as illustrated in Figure 3, location shifts or shape shifts operate in isolation, the relative PDF provides a readily interpretable picture of distributional change. In the case of a pure location shift (top left panel), the relative distribution (top right panel) is always a simple monotonic increase. At the bottom of the response scale, at the 1<sup>st</sup> decile, households in the comparison distribution are nearly 100% less likely to be at this location than reference households. At the top, at the 10<sup>th</sup> decile, comparison households are about 7.5 times more likely to be at this location of the reference distribution.<sup>6</sup> The same substantive interpretation of the relative PDF applies to the pure shape shift illustrated in the bottom left panel. At the 1<sup>st</sup> and 10<sup>th</sup> deciles, comparison households are roughly 1.5 times more likely than reference, while, in the middle, there are fewer comparison households. The comparison group, in short, has a more polarized distribution than the reference group.

--- FIGURE 4 ABOUT HERE ---

Of course, in most practical applications, the pattern of distributional change is more complicated. In the case of the Czech Republic between 1992 and 1996, there is a location shift *and* a shape shift. In such cases, the relative PDF is less informative and it is useful to isolate that portion of distributional change that occurs owing to changes in location – a shift in median income – and that portion that occurs owing to change in shape. In Figure 4, we illustrate the results of

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<sup>6</sup> From this point on, we present the relative data in histogram form to ease presentation and discussion.

decomposing the overall relative density (top right panel) in this fashion. Canceling out differences in shape between the two distributions yields the location shift (lower left panel). Canceling out differences in location between 1992 and 1996 enables one to identify the shape shift (lower right panel). Consistent with what one can glean from the relative PDF (overall RD), there was a sizable shift in location, an increase in median household income between 1992 and 1996. However, the shape shift reveals a pattern of polarization that is not visible in the overall RD. Viewed together, these results indicate that, in the course of the upswing in nominal income, some households fell behind, while others shifted toward the top, joining the ranks of those whose income put them in the top decile in 1992.

Canceling out changes in location and fitting the 1996 data to the 1992 quantile cut points, one can quite readily address the question of the “hollowing” of the middle. As one can note from the lower right panel, the distribution of household income grew more polarized, with about 40% more households joining the ranks of those whose median-adjusted income put them in the 1<sup>st</sup> decile in 1992. At the 5<sup>th</sup> and 6<sup>th</sup> deciles, in contrast, there were, respectively, roughly 25% and 30% fewer households at those locations on the reference or 1992 distribution. In sum, then, between 1992 and 1996, the Gini coefficient of household income inequality in the Czech Republic grew by about 5 Gini points. How did inequality grow? The shape shift reveals the pattern of distributional change that occurred “behind” the increase in the Gini coefficient.

--- FIGURES 5a and 5b ABOUT HERE ---

Figures 5a and 5b examine the shape shift over the longest period available between LIS Waves I and VI for four transitional and middle-income countries (5a) and four high-income countries (5b).<sup>7</sup>

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<sup>7</sup> One could use any set of comparison and reference years in the LIS series for these countries. For the purposes of presentation, we examine the longest span available in each country.

To illustrate with the case of the Slovak Republic, see the first column of Figure 5a. The panel in the first row reports the shape change, comparing the 1996 distribution of household income to the reference year distribution of 1992. When the relative density has a value of 1.0, it means there has been no change at that point on the distribution over the period under consideration. Thus the 9<sup>th</sup> decile contained relatively as many median-adjusted households in 1996 as it did in 1992. Values less than 1.0 indicate relative decline. Thus the values for the 2<sup>nd</sup>-8<sup>th</sup> deciles mean that there were fewer households at those points on the 1992 distribution. By 1996, the distribution of households had shifted from these locations to the 1<sup>st</sup> and 10<sup>th</sup> deciles, those deciles with values greater than 1.0.

To summarize these changes, we present in the bottom row of Figures 5a and 5b the change in the Gini coefficient and in two versions of the Atkinson index in each country, along with Handcock and Morris's (1999) polarization indices. Between 1992 and 1996, household income inequality in the Slovak Republic grew by 0.052, or by about five Gini points. This appears in the first bar from the left in the bottom panel of the first column of Figure 5a. The Atkinson indices, at  $\epsilon = 0.5$  and 1.0 appear, respectively, in the 2<sup>nd</sup> and 3<sup>rd</sup> bars. The mean relative polarization index (MRP), appearing in the fifth bar from the left, is positive (0.145), confirming the visual impression from the panel above. Decomposing the MRP into the contributions to distributional change made by the segments of the distribution above and below the median, it appears that “downgrading” dominated “upgrading” in the upswing in inequality in the Slovak Republic: The value of the lower relative polarization index (LRP) is greater than that of the upper relative polarization index (URP) – 0.163 vs. 0.127, respectively – consistent again with the visual impression from the shape shift above.

Results for three other transitional and middle-income societies are also presented in Figure 5a. Countries are presented in order of the size of the change in their Gini coefficients, ranging

from the Slovak Republic ( $\Delta$  Gini = 0.052) to Taiwan ( $\Delta$  Gini = 0.038). Note the variation in the inequality experience of the transitional societies. At one extreme, in the short period between 1992 and 1996, the successors to the former Czechoslovakia experienced comparatively intense polarization, surpassing that experienced by the UK and US over the period from 1979-2004 (see Figure 5b for Czech Republic). At the other – and over the longer 1986-2004 and 1992-2000 periods – the distributional consequences of transition appear less stark in the cases of Poland and Russia. Here, the increase in inequality has been more modest and polarization is less pronounced. Interestingly, this conclusion is not simply a function of the different time spans under consideration. Over the 1992-1995 period, the MRP in Poland was not appreciably larger (0.064), than the value for the 1986-2004 period (0.059). In Russia, the MRP was indeed larger for the 1992-1995 period (0.092) than for the 1992-2000 period (0.068), but these “early transition” values for Russia and Poland alike are considerably lower than those for the Czech and Slovak Republics (0.152 and 0.145, respectively).

In Figure 5b, we present results for four high-income societies, using available data from LIS Waves I – VI for the UK, US, and Sweden, and Germany. Again, we present countries in order of the size of the change in their Gini coefficients, ranging from the UK ( $\Delta$  Gini = 0.075) to Germany ( $\Delta$  Gini = 0.034). In the UK and US, where the increase in inequality has been most pronounced, upgrading has taken precedence over downgrading; that is, the shift from the middle to the upper tail has dominated the shift from the middle to the bottom in the course of rising inequality. As with the transitional societies, the experience of the high income societies has not been homogenous. In Sweden, where inequality grew by 4 Gini points between Waves I and VI, growth in the lower tail was more pronounced than growth in the upper tail. In Germany, the pattern is also distinct: There was relatively little change around the 6<sup>th</sup> and 7<sup>th</sup> deciles by 2004 relative to 1981,

fewer households at the 2<sup>nd</sup>-5<sup>th</sup> and 8<sup>th</sup>-9<sup>th</sup> deciles, and growth in the 1<sup>st</sup> and 10<sup>th</sup> deciles. Also, while, by the Gini coefficient, Germany experienced an increase in inequality that was less than half as large as that of the UK or US, the shift of households to the 1<sup>st</sup> decile of the Wave I distribution was actually more pronounced in Germany than in the UK or US.

Viewed *in toto*, the results suggest that, rather than solely being a story of “upgrading” – of the movement of a fraction of households into the upper reaches of the distribution owing to skill-biased technological change, the growth of winner-take-all markets, or, in the case of the transitional economies, the relaxation of institutional pressures that had previously compressed the top of the income distribution – the story of rising inequality has been one of polarization. Where the upswing in inequality has been most pronounced – the UK, US, and the Czech and Slovak Republics – polarization has likewise been most pronounced. Households in all four countries have shifted away from the middle of the distribution toward tails. In the UK, US and Czech Republic, upgrading has dominated downgrading in the course of polarization (i.e. more households shifted up than down), while in Slovakia the opposite occurred (i.e., downgrading was measurably more pronounced than upgrading). Where the upswing in inequality has been more modest – Poland, Sweden, Russia, Taiwan, and Germany – the pattern of distributional change is also one of polarization. In Poland and Russia, upgrading took precedence over downgrading, while in Sweden, Taiwan, and Germany, downgrading was more prominent.

Looking “behind” standard summary measures, then, we find that the experience of LIS countries with rising inequality is not entirely homogenous. While largely a story of polarization, the precise pattern of distributional change varies from country to country. In some countries, more households have “fallen behind” than have “moved ahead,” while, in others, we observe just the opposite. While it is beyond the scope of this paper to attempt to offer an explanation for these

patterns, we have begun to look at some of the “usual suspects” using the same methods. The results to date are interesting. They suggest that there is also a good bit of heterogeneity within and between demographic groups that are often treated as effectively interchangeable in comparative work.

Consider the role of changes in household structure in rising income inequality. In the US, a number of scholars have noted that the increase in inequality coincided with an increase in the proportion of households headed by single women (e.g., Levy and Michel 1991). In fact, Burtless (1999) estimates that 21% of the increase in overall family income inequality between 1979 and 1996 reflected changes in household structure. Moller, Alderson, and Nielsen (2009), find that, at the U.S. county level, the proportion of households headed by women is strongly associated with family income inequality over the 1970-2000 period. But how has the distribution of income among female-headed households changed over time; where exactly do female-headed households fall in the distribution of other households containing children; and how does this vary cross-nationally?

Consider the role of educational qualifications in rising income inequality. The skill-biased technological change account touched on above – in which technological advances have increased demand for highly educated workers – suggests that inequality has risen owing to a mismatch between the supply of educated labor and demand. This suggests a scenario of upgrading, in which the highly educated have shifted up in the distribution, progressively leaving the less-educated behind, and generating rising inequality. As regards the US, we find, indeed, that both the supply of highly educated workers and the returns to education have increased, suggesting rising demand for highly educated labor. We likewise find that this increased demand can be linked to skill upgrading in industries that utilize computers (Autor, Katz, and Krueger 1998). But how has the distribution

of income among less-educated households changed over time; where exactly do such households fit in the distribution of highly-educated households; and how does this vary cross-nationally?

--- FIGURE 6 ABOUT HERE ---

In the top row of Figure 6, we present the shape shift for female-headed households (FHH) in the UK and US between Waves I and VI. We define FHH as households containing only women and minor children (i.e., <18 years of age). As one can note, in the UK, FHH have converged toward the center of the 1979 distribution. By 2004, there were more median-adjusted FHH in the 4<sup>th</sup> – 7<sup>th</sup> deciles and fewer in the 1<sup>st</sup> – 3<sup>rd</sup> and 9<sup>th</sup> – 10<sup>th</sup> deciles. In the US, in contrast, we observe a pattern of divergence or polarization. Relative to 1979, some FHHs moved up, but more fell behind, joining the ranks of those FHHs that were in the bottom two deciles in 1979. In the last few decades, it appears that the experience of the population of lone mothers in the US systematically differs from that of lone mothers in the UK.

We can also take FHHs and examine how they differ in shape from other sorts of households. In the bottom row of Figure 6, we compare female-headed households to households containing only couples and their minor children in Wave VI (2004), canceling out differences in location and fitting the FHH distribution to the quantile cut points of the reference distribution. As one can note, not only is the distribution of income among FHHs converging over time in the UK (top row), it is also, in Wave VI, more homogenous than the distribution of households containing couples and minor children. There are fewer FHHs at the very top of the distribution of income among households containing couples and minor children, and fewer FHHs at the bottom of that distribution as well. In the US, in contrast, the distribution of income among female-headed households has been polarizing or diverging over time (top row), and it is also, in Wave VI, more

polarized than the distribution of households containing couples and minor children: There are more FHHs at the bottom, and more at the top as well.

These differences between the US and UK would seem to have a number of implications, but the most obvious is that female-headed households appear to be “different animals” in each country: In the UK, FHHs look increasingly similar to one another over time and presently exhibit a distribution that is more homogenous than that exhibited by other households with children. In the US, FHHs look increasingly dissimilar over time and exhibit a distribution that is more polarized relative to other households with children.

--- FIGURE 7 ABOUT HERE ---

In the top row of Figure 7, we present the shape shift for households whose heads *and* spouses/partners lack tertiary degrees (equivalent of the US B.A. degree) in the UK and US between Waves V and VI. While there is a small convergence trend in the UK, in the US there was almost no change in the shape of the distribution of income among this subset of households. In the UK, then, less-educated households (LEH) grew marginally more homogenous between 1999 and 2004, while in the US the shape of the distribution of income among LEH was effectively unchanged over the 2000-2004 period.

We can also examine how LEH differ in shape from other sorts of households along the education dimension. In the bottom row of Figure 7, we compare LEH to households in which both heads *and* spouses/partners possess tertiary degrees in Wave VI (2004), canceling out differences in location and fitting the LEH distribution to the quantile cut points of the reference distribution. In the UK, we find that the distribution of income among LEH converged over time (top row), and that it is also, in Wave VI, more homogenous than the distribution of households in which both heads and spouses/partners possess tertiary degrees (HEH). Unsurprisingly, LEH are

about 25% less likely to have median-adjusted incomes that place them in the 10<sup>th</sup> decile of the HEH distribution, but note that they are about 25% less likely to fall into the 1<sup>st</sup> decile as well. They are 15% more likely to have incomes in the 5<sup>th</sup> decile. In the US, we find that the shape of the distribution of income among LEH changed little over time (top row), and that it is also, in Wave VI, more polarized than the distribution of income among HEH. Such households are about more than 40% more likely to have median-adjusted incomes that place them in the 1<sup>st</sup> decile of the HEH distribution, about 20% less likely to have incomes that place them in the 5<sup>th</sup> decile, and 30% more likely to have incomes placing them in the 9<sup>th</sup> decile. Unsurprisingly, they are about 15% less likely to fall in the 10<sup>th</sup> decile.

Viewed, for instance, through the lens of accounts of skill-biased technological change, the results are quite interesting. In the UK, the descriptives seem most consistent with more sanguine views of the rise of the information and service sectors: Technological change may be generating a growing proportion of jobs at the very top, and rising inequality overall as a result (e.g., Figure 5b), but this does not appear to have been accompanied by any stark downgrading of less-educated households. Rather, such households have simply been left behind by the newly affluent, falling into the broad middle of the distribution of all highly-educated households. In the US, the descriptives seem more consistent with less optimistic accounts of technological change: As with the UK in Figure 5b, the rise of the tertiary sector may be generating a growing proportion of jobs at the very top, but this has also been accompanied by polarization of LEH relative to HEH. There are more LEH at the bottom of the HEH distribution, more (9<sup>th</sup> decile) or just as many (8<sup>th</sup> decile) in the upper tail but fewer in the middle (i.e., 3<sup>rd</sup> – 7<sup>th</sup> deciles). As was the case with our examination of female-headed households, these results suggest systematic differences between countries that –

looking across the rich world, from Japan to Sweden, and Germany to Italy – are often cast as more similar, institutionally and culturally, than different.

## DISCUSSION AND CONCLUSIONS

These results have a number of implications for our understanding of inequality in these societies. Considering, again, pure upgrading accounts of the upswing in inequality, our analysis of the LIS data indicate that there is more to the story of rising household inequality in these societies than that of the movement of a fraction of households into the upper reaches of the distribution. Rather, we find that the distribution of income is evolving in such a way that households are moving toward the top *and* the bottom of the distribution relative to the past. Has the middle hollowed out? Our analysis suggests that it has. It is also important to note the fact that when one decomposes observed polarization or “hollowing” into the contributions of the upper and lower tails, the experience of these societies that we examine in this paper is heterogeneous, with upgrading taking precedence over downgrading in the US, UK, Czech Republic, Poland, and Russia, and downgrading dominating upgrading in the Slovak Republic, Taiwan, Sweden, and Germany. What we find, then, is not entirely inconsistent with the upgrading explanations. Rather, it suggests that factors producing upgrading may simply be “some among many” driving contemporary inequality trends. For instance, when considering the transitional economies, a range of distinctive institutional changes have obviously played a heavy role in reshaping the distribution of income (e.g., Večerník 2001; Kattuman and Redmond 2001; Kislitsyna 2003).

Looking forward, these results also highlight the utility of focusing on change at all points on the distribution as opposed to focusing on summary inequality measures alone (Nielsen 2007). For example, given that it is often difficult to measure in a compelling fashion, arguments about skill-

biased technological change are not infrequently arguments about the residual: regress a summary measure of inequality on the “usual suspects” and what remains is deemed “technological change.” With the techniques we apply in this paper, one could more rigorously pursue model-based or residual approaches to assessing the impact of technological change or, indeed, use the relative data to directly relate measures of technology to change at particular points on the distribution. By focusing on the comparison between income distributions, rather than on their individual shapes, the analyst is forced to be precise about exactly how different factors should affect inequality. For example, in US research, changes in household structure have regularly been observed to be a major culprit in the upswing in family and household income inequality. Given that female-headed households have lower-than-average incomes, the growth of such households is typically argued to affect the distribution of income by inflating the proportion of poor households (e.g., Nielsen and Alderson 1997). However, when one examines the evolution of the distribution of income among female-headed households over time, and places such households in the distribution of other households containing children (Figure 6), it is clear that, while one part of the often-observed compositional effect of the growth of female-headed households on inequality results from differences in average income between female-headed and other households, one part results from growing inequality within this sub-set of households and from its polarization relative to other types of households.

In conclusion, the evidence suggests that global income inequality has either plateaued or declined in recent decades. At the same time, within the typical nation, inequality has been rising. For the first time in nearly two-hundred years, within-nation inequality has become a growing component of global income inequality. The phenomenon of rising within-nation inequality appears unlikely to have been driven primarily by the set of “classic” or “traditional” factors associated with

the industrial transition (e.g., the Kuznets problematic). In its place, a wide variety of explanations have been offered to account for the rise in inequality. Rather than attempt to adjudicate between these accounts – which we have done elsewhere – we have taken a close look at the data that inform the debate. We have aimed to demonstrate how an examination of the pattern of distributional change occurring “behind” the summary measures can aid in thinking about the phenomenon itself, and accounts thereof. A key substantive conclusion emerging from our research on LIS countries is that the pattern of distributional change in countries experiencing rising inequality is, in broadest terms, similar from one country to the next. This similarity is intriguing. It suggests an underlying commonality in the contemporary inequality experience of an otherwise heterogeneous group of countries – ranging from Russia to the US, and from Taiwan to Sweden. In our view, this suggests the operation of common global/transnational processes – a common set of exogenous factors – “filtered” through social structure to produce intercept and slope differences, but also reshaping the distribution of income in similar ways.

## WORKS CITED

- Alderson, Arthur S., and François Nielsen. 2002. "Globalization and the Great U-turn: Income Inequality Trends in 16 OECD Countries." *American Journal of Sociology* 107:1244–99.
- Alderson, Arthur S., Jason Beckfield and François Nielsen. 2005. "Exactly How Has Income Inequality Changed? Patterns of Distributional Change in Core Societies." *International Journal of Comparative Sociology* 46:405-423.
- Autor, David H., Lawrence F. Katz, and Alan B. Krueger. 1998. "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics* 113:1169–1213.
- Blank, Rebecca M. 1998. "Contingent Work in a Changing Labor Market." Pp. 258-94 in Richard B. Freeman and Peter Gottschalk. (Eds.) *Generating Jobs: How to Increase Demand for Less-Skilled Workers*. New York: Russell Sage Foundation.
- Blau, Francine D., and Lawrence M. Kahn. 2002. *At Home and Abroad: U.S. Labor Market Performance in International Perspective*. New York: Russell Sage Foundation.
- Blau, Francine D., Marianne A. Ferber, and Anne E. Winkler. 2010. *The Economics of Women, Men, and Work*. 6<sup>th</sup> ed. Upper Saddle River, NJ: Prentice-Hall.
- Bourguignon, Francois, and Christian Morrisson. 2002. "Inequality among World Citizens: 1820-1992." *American Economic Review* 92:727-44.
- Brady, David. 2009. *Rich Democracies, Poor People: How Politics Explain Poverty*. Oxford: Oxford University Press.
- Burtless, Gary. 1999. "Effect of Growing Wage Disparities and Family Composition Shifts on the Distribution of U.S. Income." *European Economic Review* 43:853-65.
- Cancian, Maria, and Deborah Reed. 2001. "Changes in Family Structure: Implications for Poverty and Related Policy." Pp. 69-96 in Danziger, Sheldon H. and Robert H Haverman. (Eds.) *Understanding Poverty*. New York: Russell Sage Foundation.
- Cornia, Giovanni Andrea and Tony Addison. 2003. "Income Distribution Changes and their Impact in the Post-World War II Period." *World Institute for Development Economics Research Discussion Paper No. 2003/28*.
- Deininger, Klaus, and Lyn Squire. 1998. "New Ways of Looking at Old Issues: Inequality and Growth." *Journal of Development Economics* 57:259-287.

- DiNardo, John E., Nicole Fortin, and Thomas Lemieux. 1996. "Labour Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach." *Econometrica* 64:1001-1046.
- DiPrete, Thomas A., Dominique Goux, Eric Maurin, and Amélie Quesnel-Vallée. 2006. "Work and Pay in Flexible and Regulated Labor Markets: A Generalized Perspective on Institutional Evolution and Inequality Trends in Europe and the U.S." *Research in Social Stratification and Mobility* 24:311-32.
- Firebaugh, Glenn. 1999. "Empirics of World Income Inequality." *American Journal of Sociology* 104:1597-1630.
- Firebaugh, Glenn. 2003. *The New Geography of Global Income Inequality*. Cambridge, MA: Harvard University Press.
- Frank, Robert H. and Phillip J. Cook. 1995. *The Winner-Take-All Society*. New York: Free Press.
- Friedman, Thomas. 2005. *The World is Flat: A Brief History of the Twenty-First Century*. New York: Farrar, Straus and Giroux.
- Goesling, Brian. 2001. "Changing Income Inequalities within and between Nations: New Evidence." *American Sociological Review* 66:745-61.
- Handcock, Mark S. and Martina Morris. 1999. *Relative Distribution Methods in the Social Sciences*. New York: Springer-Verlag.
- Harrison, Bennett, and Barry Bluestone. 1988. *The Great U-Turn: Corporate Restructuring and the Polarizing of America*. New York: Basic Books.
- Hung, Ho-fung. 2009. "America's Head Servant: The PRC's Dilemma in the Global Crisis." *New Left Review* 60:5-25.
- International Labour Organization. 2009. *Global Employment Trends: January 2009*. Geneva: ILO.
- Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1993. "Wage Inequality and the Rise in Returns to Skill." *Journal of Political Economy* 101:410-42.
- Kattuman, Paul and Gerry Redmond. 2001. "Income Inequality in Early Transition: The Case of Hungary 1987-1996." *Journal of Comparative Economics* 29:40-65.
- Kenworthy, Lane, and Jonas Pontusson. 2005. "Rising Inequality and the Politics of Redistribution in Affluent Countries." *Perspectives on Politics* 3:449-71.
- Kislitsyna, Olga. 2003. "Income Inequality in Russia during Transition: How Can it be Explained?" *Economics Education and Research Consortium Working Paper No. 03/08*.
- Kuznets, Simon. 1955. "Economic Growth and Income Inequality." *American Economic Review* 45:1-28.

- Lemieux, Thomas. 2002. "Decomposing Changes in Wage Distributions: A Unified Approach." *Canadian Journal of Economics* 35:646-688.
- Levy, Frank, and Richard J. Murnane. 1992. "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations." *Journal of Economic Literature* 30:1333-81.
- Levy, Frank, and Richard C. Michel. 1991. *The Economic Future of American Families: Income and Wealth Trends*. Washington, D.C.: Urban Institute Press.
- "Luxembourg Income Study (LIS) Database." 2010. Retrieved February-May 2010. (<http://www.lisproject.org/techdoc.htm>).
- Machado, José A.F. and José Mata. 2005. "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regression." *Journal of Applied Econometrics* 20:445-465.
- McCall, Leslie. 2001. "Sources of Racial Wage Inequality in Metropolitan Labor Markets: Racial, Ethnic, and Gender Differences." *American Sociological Review* 66: 520-542.
- Milanovic, Branko. 2002. "True World Income Distribution, 1988 and 1993: First Calculation Based on Household Surveys Alone." *Economic Journal* 112:51-92.
- Milanovic, Branko. 2005. *Worlds Apart: Global and International Inequality 1950-2000*. Princeton, NJ: Princeton University Press.
- Moller, Stephanie, David Bradley, Evelyne Huber, François Nielsen, and John Stephens. 2003. "Determinants of Poverty in Advanced Capitalist Democracies." *American Sociological Review* 68:22-51.
- Moller, Stephanie, Arthur S. Alderson and François Nielsen. 2009. "Changing Patterns of Income Inequality in U.S. Counties, 1970-2000." *American Journal of Sociology* 114:1037-1101.
- Morris, Martina, Annette D. Bernhardt and Mark S. Handcock. 1994. "Economic Inequality: New Methods for New Trends." *American Sociological Review* 59:205-19.
- Nielsen, François. 1994. "Income Inequality and Industrial Development: Dualism Revisited." *American Sociological Review* 59:654-677.
- Nielsen, François, and Arthur S. Alderson. 1995. "Income Inequality, Development, and Dualism: Results from an Unbalanced Cross-National Panel." *American Sociological Review* 60:674-701.
- Nielsen, François and Arthur S. Alderson. 1997. "The Kuznets Curve and the Great U-Turn: Patterns of Income Inequality in United States Counties, 1970-90." *American Sociological Review* 62:12-33.
- Nielsen, François. 2007. "Economic Inequality, Pareto, and Sociology: The Route Not Taken." *American Behavioral Scientist* 50:619-638.

- Piketty, Thomas and Emmanuel Saez. 2003. "Income Inequality in the United States, 1913-1998." *Quarterly Journal of Economics* 118:1-39.
- Pomeranz, Kenneth. 2000. *The Great Divergence*. Princeton, NJ: Princeton University Press.
- Sala-i-Martin, Xavier. 2002. "The Disturbing 'Rise' of Global Income Inequality." NBER Working Paper no. 8904.
- Schultz, T. Paul. 1998. "Inequality in the Distribution of Personal Income in the World: How It Is Changing and Why." *Journal of Population Economics* 11:307-44.
- Subramanian, S. 2002. "An Elementary Interpretation of the Gini Inequality Index." *Theory and Decision* 52: 375–379.
- Večerník, Jiří. 2001. "From Needs to the Market: The Changing Inequality of Household Income in the Czech Transition." *European Societies* 3:191-212.
- Wood, Adrian. 1994. *North-South Trade, Employment, and Inequality*. Oxford: Oxford University Press.

Figure 1. The Evolution of the Kuznets Curve

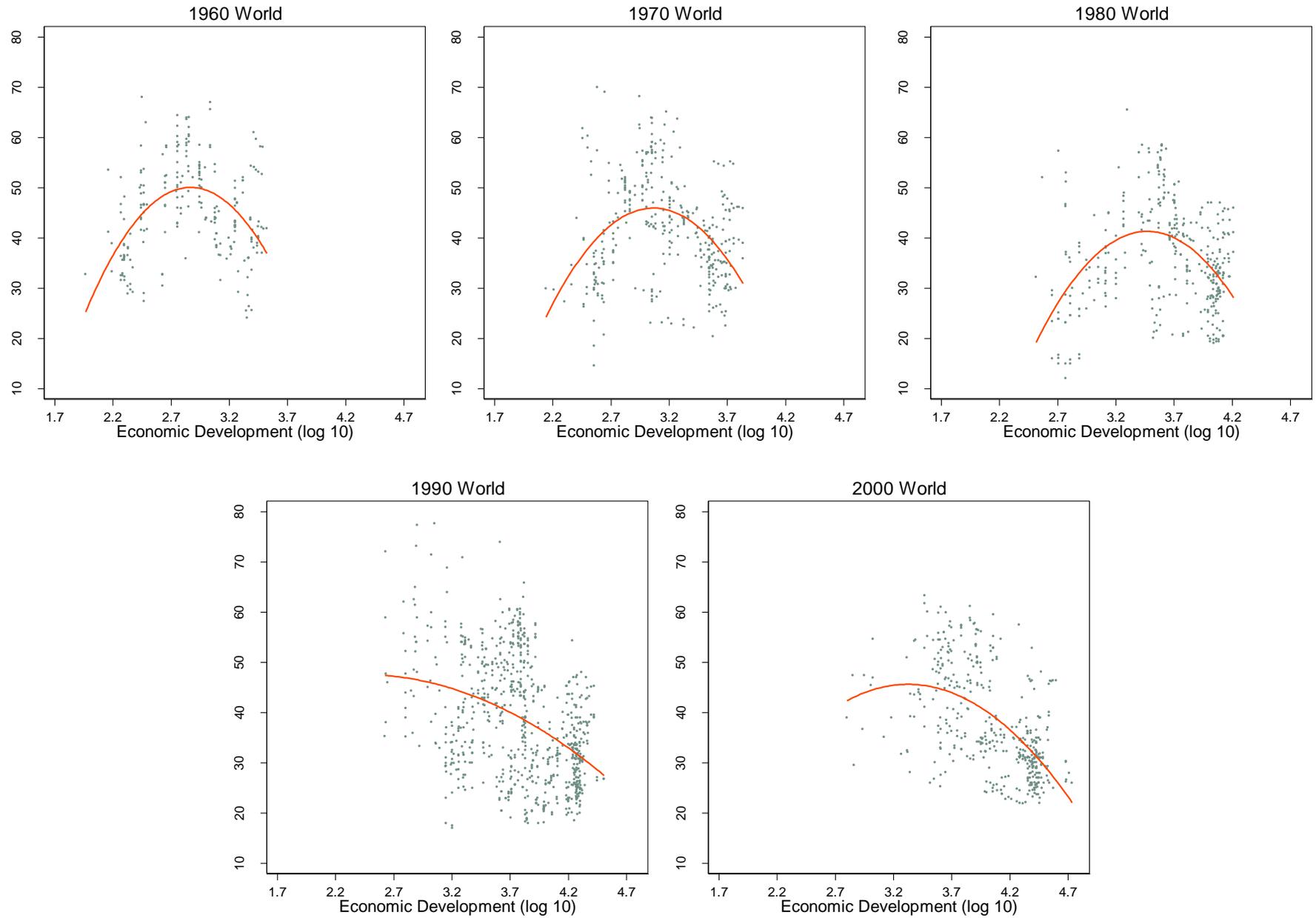


Figure 2. The distribution of household income in the Czech Republic, 1992 and 1996 (top) and relative PDF (bottom)

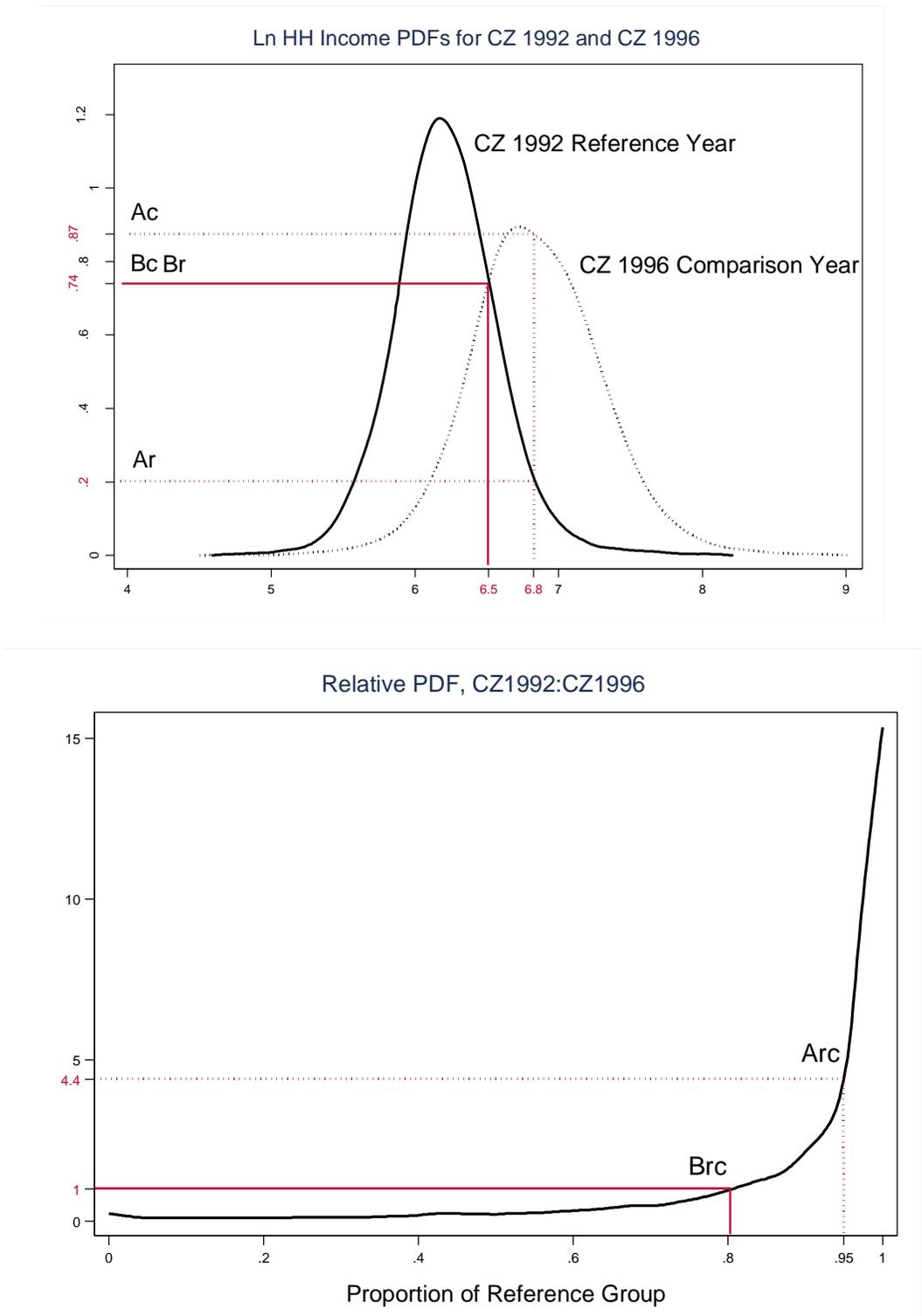


Figure 3. Pure location and shape shifts and the relative PDF

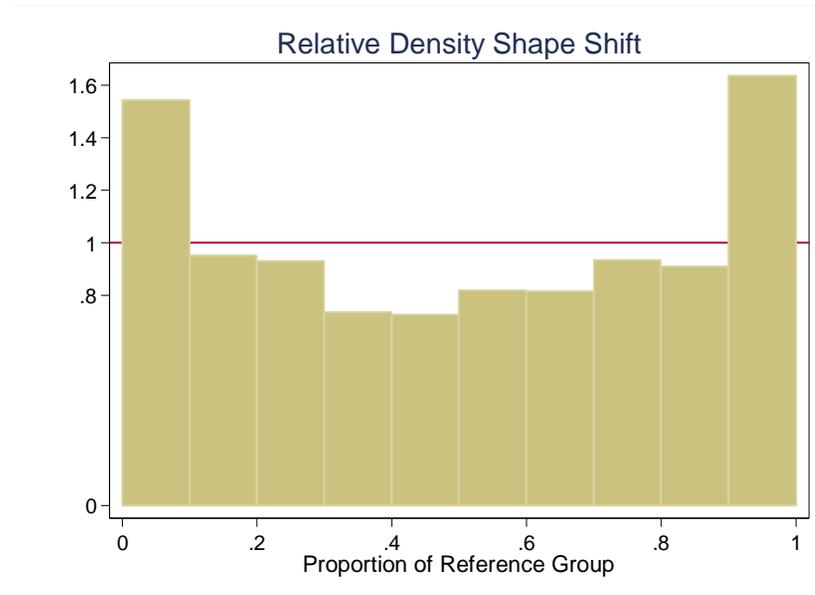
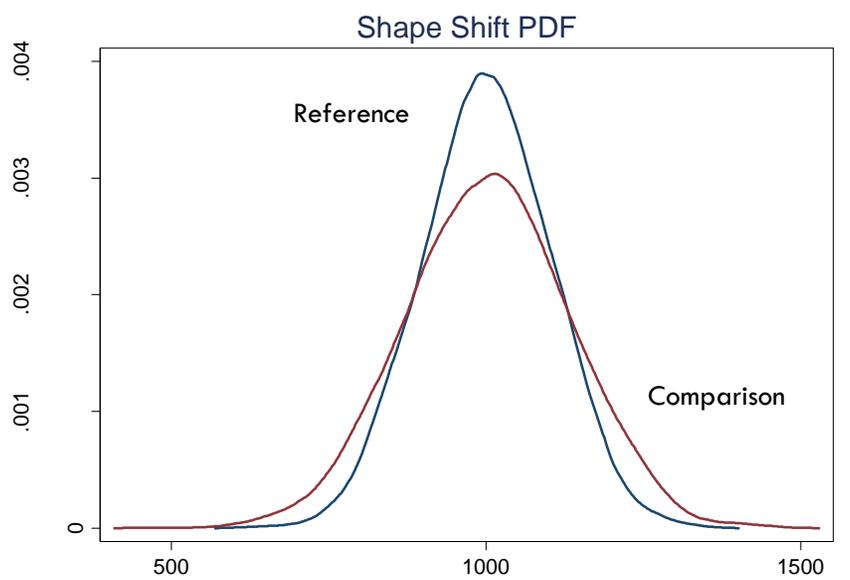
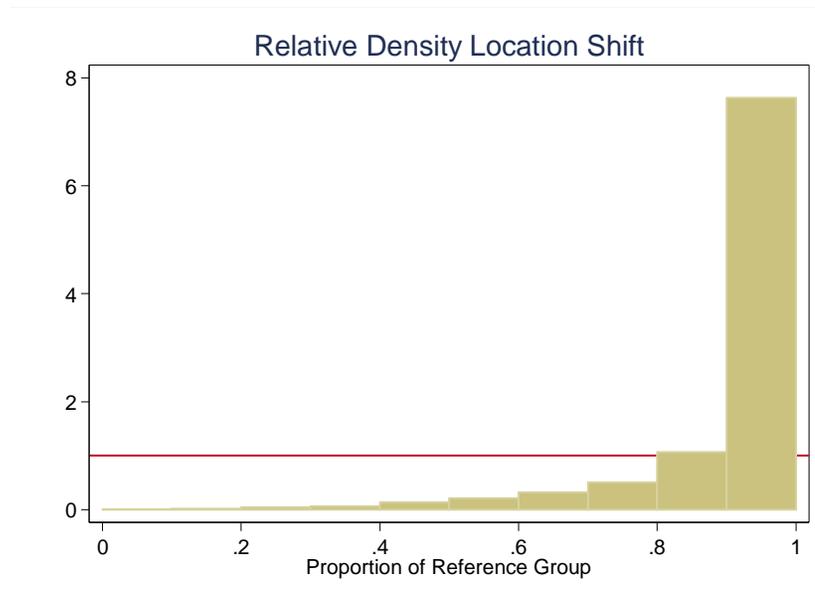
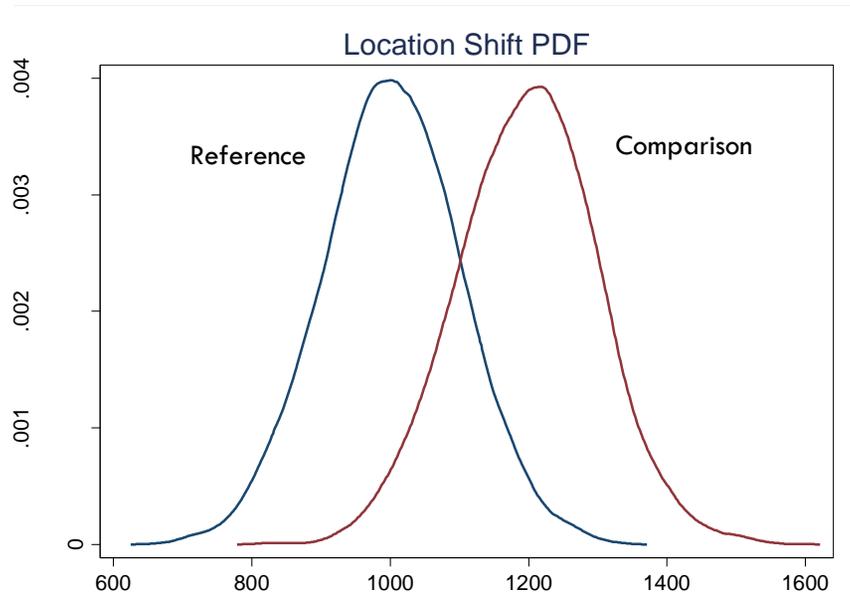


Figure 4. Decomposition of overall RD (relative PDF) into location and shape shifts: Czech Republic, 1992-1996

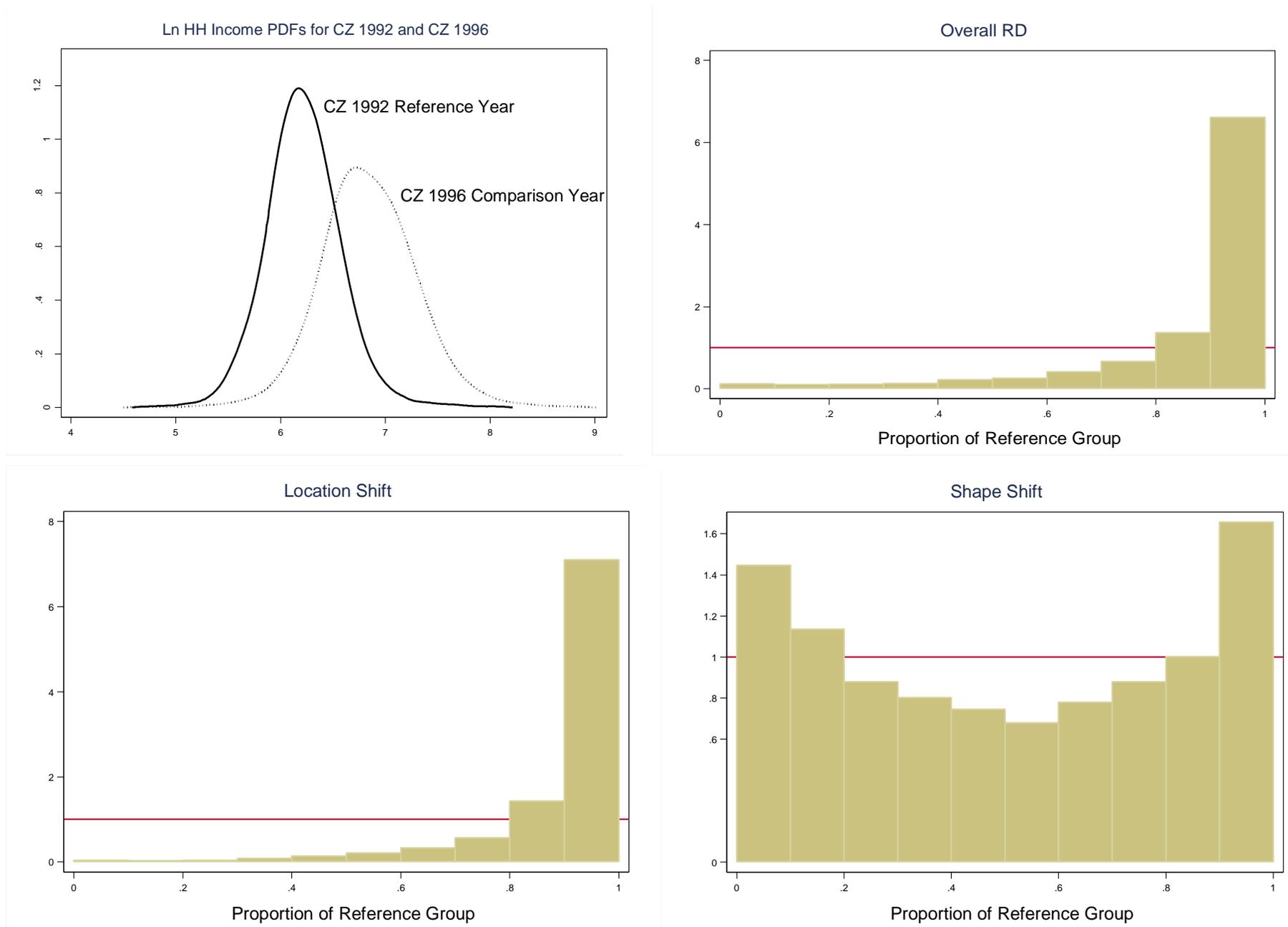


Figure 5a. Shape shifts (top) and summary inequality and polarization measures (bottom): Slovak Rep., Poland, Russia, and Taiwan

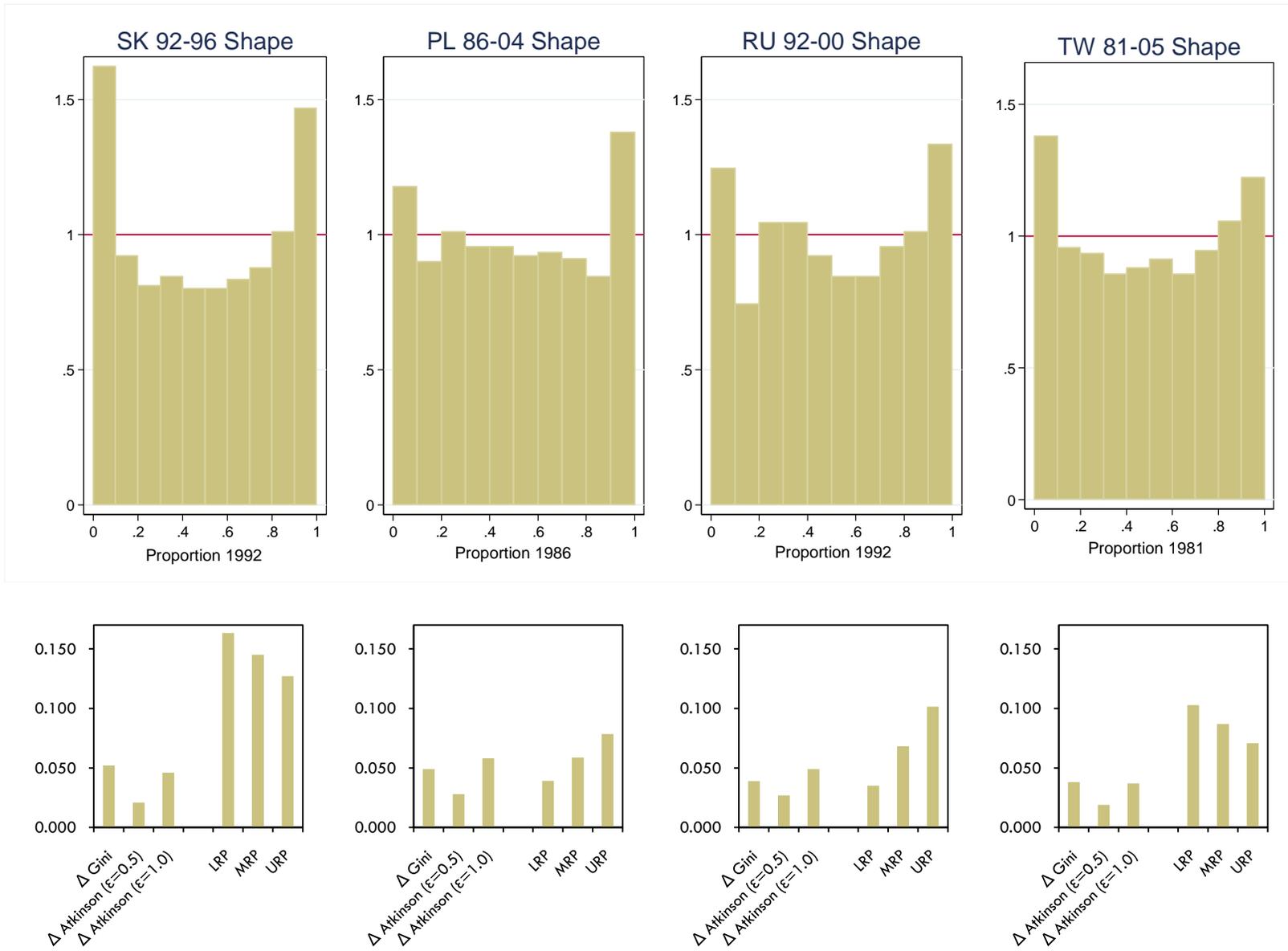


Figure 5b. Shape shifts (top) and summary inequality and polarization measures (bottom): UK, US, Sweden, and Germany

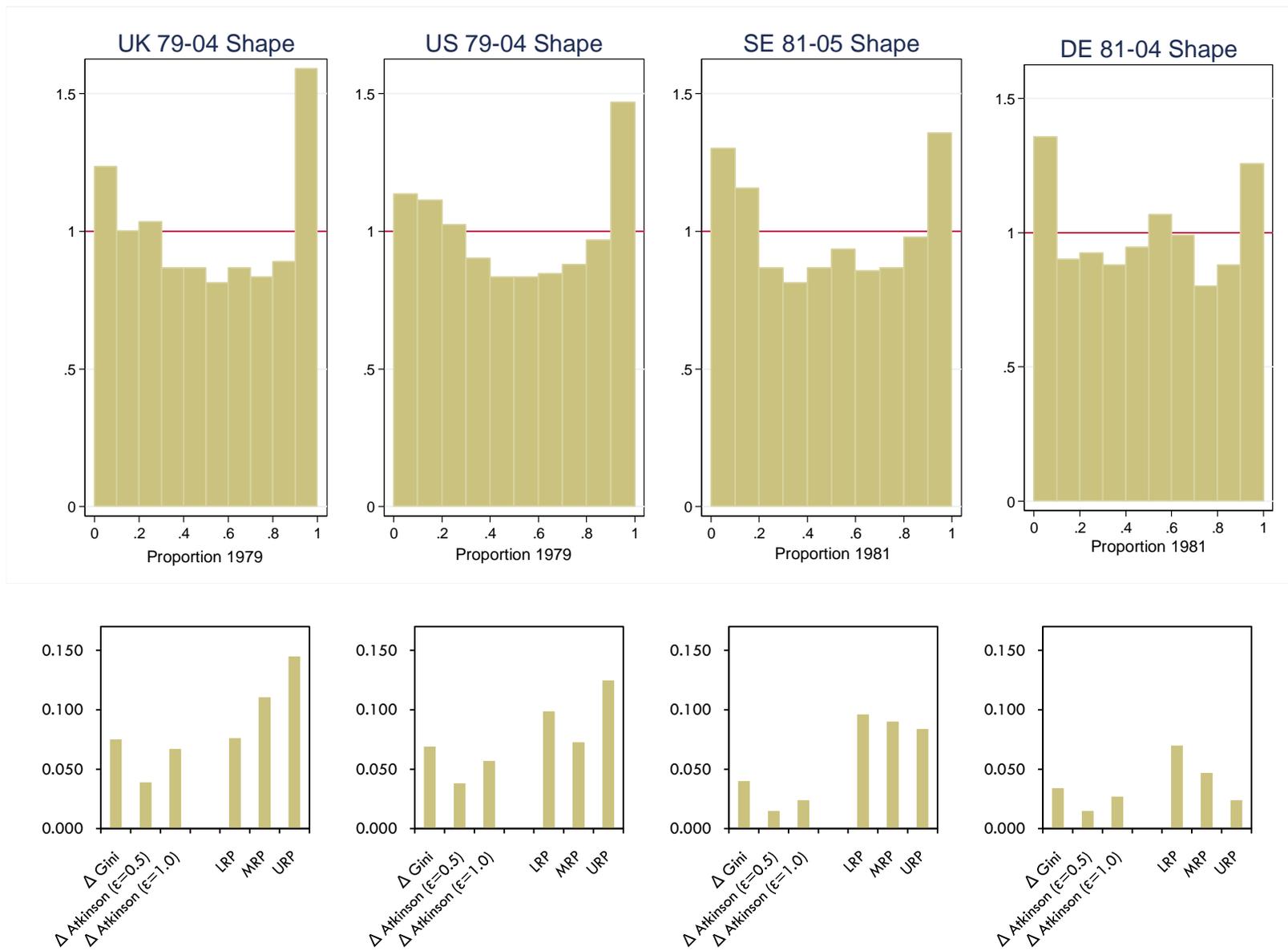


Figure 6. Shape shift in distribution of income among female-headed households, LIS Wave I – VI (top) and female-headed households in the distribution of households containing couples and children, LIS Wave VI (bottom)

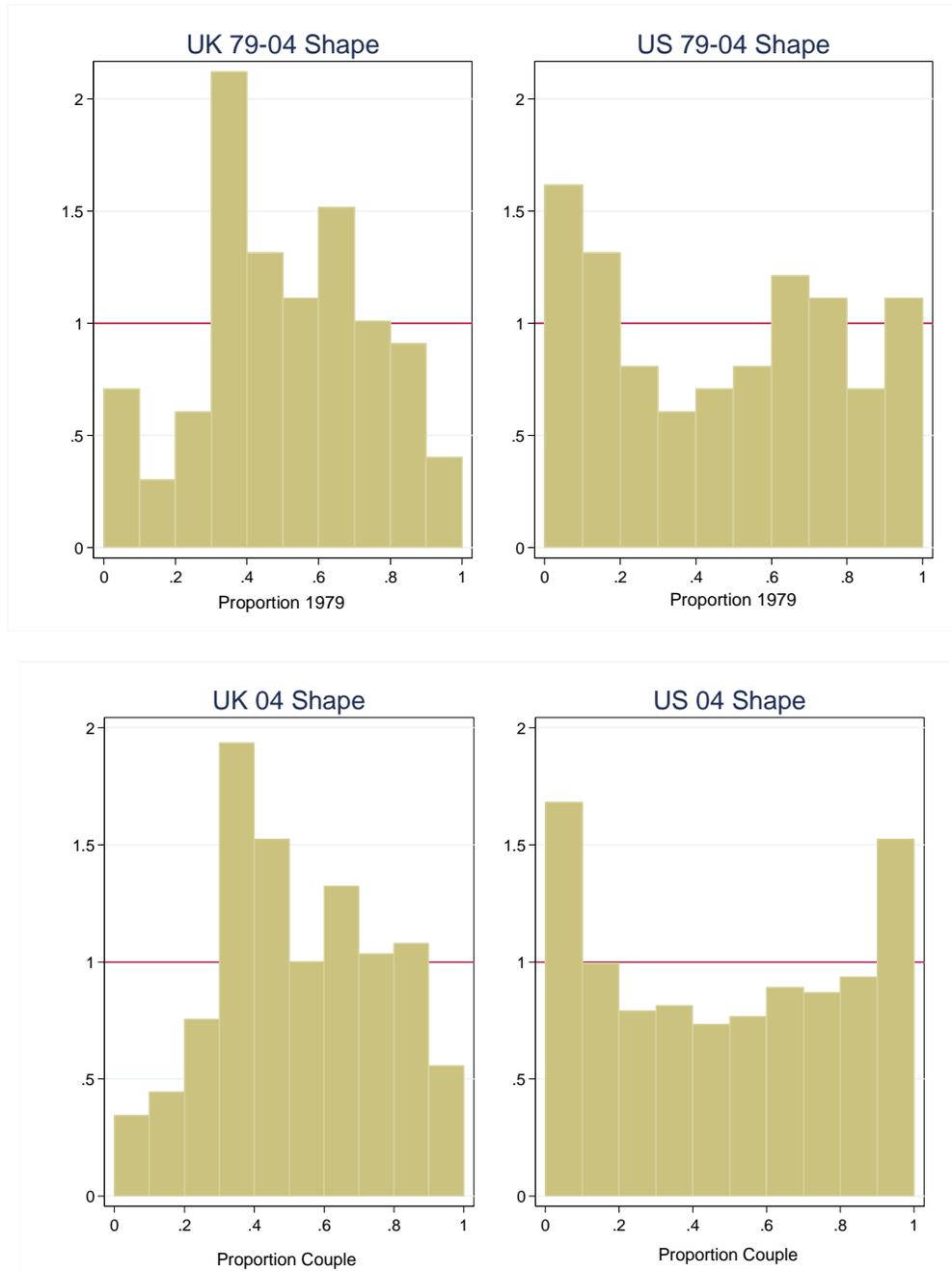


Figure 7. Shape Shift in distribution of income among households without university qualifications, LIS Wave V – VI (top) and households without qualifications in distribution of highly-educated households, LIS Wave VI (bottom)

