

Income Inequality in Richer and OECD Countries

Chapter 4

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1. Introduction

Many different variables can be used to evaluate the distribution of living standards in a society. These *focal variables*, as labeled by Sen (1992: 20), include monetary indicators, such as expenditure, income and wealth, as well as non-monetary indicators like multidimensional measures of material standard of living, happiness and life satisfaction, functioning and capabilities. In this Chapter, income is taken as the focal variable, leaving earnings, consumption, wealth, happiness and other dimensions of social and economic well-being to later chapters.

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The distribution of income among persons, or households, has attracted the attention of social scientists at least since Pareto's analysis of the revenue curve in 1897. Income is still the most common indicator of economic resources in rich countries, although consumption expenditure is often used in developing countries. Section 1 outlines the conceptual difference between consumption, current income and permanent income, and then moves on to examine the nuances of the definition of income and the further methodological decisions that need to be taken to study income inequality. Some of these issues are discussed in greater detail in Chapter 3 on measurement and Chapter 14 on consumption and time use. Section 2 deals with the empirics of income distribution in richer countries, leaving to Chapter 24 the discussion of low and middle income countries. The section covers both the evidence at the turn of the century and the evolution over the last thirty years of the inequality of market and disposable incomes, and the role of cash and non-cash redistribution. Section 3 concludes with suggestions for future research.

2. Measuring Inequality in Living Standards: Income as the Focal Variable

Consumption, permanent income, and current income

The nearest alternative to income is consumption or consumption expenditure, a variable which is often preferred in less developed countries since it is smoothed over time and is less volatile and less reliant on seasonal variation than is income, especially in agricultural societies (Deaton and Grosh 2000; see also Chapters 14 and 24).² Apart from this

² Income-based Gini indices are reported by the World Bank (2005: 280-1, Table A2) for 22 of the 27 high-income economies for which the statistics are available, 20 of the 60 middle-income economies, and only one of the 39 low-income economies. As observed by the World Bank (2005: 38, Box 2.5), income tends to be more unequally distributed than expenditure to a degree that varies across countries. Mixing income-based and consumption-based statistics confounds international comparisons, and is not to be advised. See Chapter 24 for more on attempts to harmonize measure of inequality when data are missing or quality is suspect.

practical reason, many economists view consumption as a better proxy of well-being than income. A first argument is that well-being (utility) is a function of the goods and services actually consumed (Slesnick 1994). However, focusing on the *means available* to purchase commodities (income) rather than the commodities actually purchased (expenditure) makes the assessment of well-being independent of the purchase choice. Sen offers the example “... of the person with means who *fasts* out of choice, as opposed to another who *has to* starve because of lack of means” (1992: 111-2), while Hagenars *et al.* (1994: 8) argue that using income helps us avoid the trap of identifying voluntary low levels of consumption with deprivation.

A second argument in favor of consumption is that it is more closely related to permanent income or lifetime resources than current income. As described by Friedman (1957: 209), the distributions of current income “... reflect the influence of differences among individual units both in ... the permanent component of income and ... the transitory component. Yet these two types of differences do not have the same significance; the one is an indication of deep-seated long-run inequality, the other, of dynamic variation and mobility”. If one is interested in “deep-seated long-run inequality”, permanent income, and hence consumption, is what matters. However, the simple proportionality between consumption and permanent income in the baseline inter-temporal consumer’s optimization problem does not hold if some of its basic hypotheses are relaxed and simple forms of personal heterogeneity are introduced (in life-span, accumulated or inherited wealth, degree of inter-generational altruism, variability of uncertain labor incomes, and capacity to borrow, to name just a few). Therefore, current consumption may not be a very good, and not even the best available, proxy of permanent income. Moreover, it is far from obvious that “deep-seated long-run inequality” should be our concern. The concept has some natural appeal: an undergraduate may have current income below that of a manual worker of the same age, but

he is likely to be better off within a few years, and for most of his lifetime. But “the promise of resources in the future may do little to pay the bills today” (Deaton and Grosh 2000: 93). In the real world, capital markets are imperfect and persons face borrowing constraints that render the actual standard of living dependent on current available resources. Conversely, “... the fact that an old person had a high income thirty years ago does not make up for his having a pension that is below his needs today”(Atkinson 1983: 44).

More generally, the problem is that of defining the reference time period for the analysis of inequality (Atkinson 1983; Atkinson, Rainwater and Smeeding 1995). Typically, the longer the accounting framework, the lower is the degree of measured inequality. At intra-annual frequencies, income may fluctuate owing to seasonal factors (e.g., in agriculture), movement of workers into or out of jobs, or the timing of payments (e.g., interest on financial assets or liabilities, dividends on stocks): aggregating over the year implies averaging out these differences, although the overall impact on measured inequality may be small (Böheim and Jenkins 2006). By the same token, lengthening the reference period beyond the year reduces measured inequality by smoothing the variability due to the business cycle or the life-cycle (e.g., Björklund 1993; Björklund and Palme 2002). But the ex-ante assessment of total lifecycle wealth presents several difficulties and is highly sensitive to measurement assumptions.³

Finally, there is the problem of measurement of “true” consumption in rich societies.

Consumption expenditure data are collected mainly to provide weights and prices for

³ Assuming that a person i lives T years, starts working at age T_1 and retires at age T_2 , his lifetime wealth can be defined as $Y_i \equiv \sum_{t=0}^{T-1} (1+r_t)^{-t} (h_{it} / p_t) + \sum_{t=T_1}^{T_2-1} (1+r_t)^{-t} (y_{it} / p_t) + \sum_{t=T_2}^{T-1} (1+r_t)^{-t} (x_{it} / p_t)$, where h_{it} is any capital or money transfer received by the person at time t (other than pension), y_{it} and x_{it} denote his labor earnings and pension, and p_t is a price deflator. In order to measure permanent income, we need to know: *i*) person’s life-span as well as the ages of entry into the job market and of retirement; *ii*) the amount and timing of any transfer a person receives from relatives, friends, private or public institutions; *iii*) the path of labor income; *iv*) the flow of pension payments; *v*) the appropriate discount rates r_t and price deflators p_t (both possibly indexed to i). Further complications arise when households rather than individuals are the object of the analysis, as births, divorces, re-marriages and the like need to be accounted for.

measuring the consumer price index, not for measuring consumption. Very few surveys actually try to measure actual consumption, because purchases of durables such as major appliances, automobiles and especially housing must all be spread out over the useful life of the good which is bought in one period but consumed in another. Indeed measures of consumption may differ greatly from consumer expenditures for such persons as older units living in an owned but mortgage-free house (Johnson, Smeeding and Torrey 2005).

In brief, there is a priori no cogent or practical reason to prefer consumption to income, or permanent income to current income. Indeed Haig (1921) and Simons (1938) recognized that income represents the *possibility* to consume, and therefore established their famous identity that income equals consumption plus or minus changes in net worth. Most often, the choice is driven by the available information and there is a clear preference amongst rich nations to rely on income and not consumption. Current income, as measured over a span of a year, appears to be a satisfactory measure of the (material) living standard of people.

Income definition

Definitional problems do not cease with the choice of current (yearly) income as the focal variable. There are many different items that concur to form the income of a person, or a household, in a year (Smeeding and Weinberg 2001). The basic distinction is between the *market* or *original* income and the *disposable* income. On the basis of the recommendations of the final report of the Expert Group on Household Income Statistics–The Canberra Group (2001), market income should include all types of earnings gross of employees' social insurance contributions, self-employment income, all types of capital income including interest, rent or dividends received and subtracting interest paid, plus private pensions. Disposable income takes market income and subtracts direct taxes (including employee's contributions to social insurance), but ignores other "indirect" taxes (property, wealth and

value added taxes); then it adds back in regular inter-household cash transfers received net of those made, and all forms of cash and near-cash public income transfers including social insurance benefits (for social retirement, disability and unemployment), universal social assistance benefits, and targeted income transfer programs like social maintenance. Near-cash benefits in the form of housing allowances or food stamps are included as are negative taxes (for instance in-work benefits now popular in many rich nations). In practice, many surveys exclude various elements of market incomes, such as interest paid, or private transfers made to other households.

However broad these definitions might be, they exclude imputed rents, capital gains and losses and other unrealized types of capital income, home production, and in-kind transfer benefits such as education and health insurance. Because these items may account for an important share of the economic resources at the household's disposal, their inclusion in the income definition may affect measured inequality. Indeed, recent research on the United States suggests that uncounted realized and unrealized income from capital raises measured incomes by over 40 percent at the mean and more than 20 percent at the median (Smeeding and Thompson 2007).

Imputed rent for owner-occupied dwellings tend to benefit a wide range of low to high income units, especially the elderly, but their overall effect may vary across countries, depending on the level of housing prices and the diffusion of home-ownership (Frick and Grabka 2003). Unrealized appreciation and untaxed income from capital, as well as capital gains, mainly benefit higher income units. Indirect taxes have a relatively larger impact on the budget of lower income units, but the opposite happens with the imputation of in-kind public benefits for health care, housing and education valued at their cost of provision (see also section 2.3 below). As the value of these benefits is spread more or less evenly among beneficiaries ("potential" beneficiaries in the case of health insurance), the result is to

augment income by a fixed amount, which accounts for a larger fraction of income at lower income levels. In general, elder households and households with children are net gainers from the imputation, through health insurance and education benefits, respectively, while middle age childless units are net losers. These results are very sensitive to the imputation assumptions: both valuing benefits according to willingness to pay and accounting for the quality of services provided would lower benefits to the poor (Smeeding 1982).

As stressed by the Expert Group on Household Income Statistics–The Canberra Group (2001: pp. 62-7), the under coverage of property and self-employment income, own account production, imputed rent for owner-occupied dwellings, social transfers in-kind, capital gains and other unrealized income from wealth are major issues to be addressed in expanding internationally comparable income measures. But the analysis of these augmented notions of income is also scarce at the national level.⁴

Further empirical choices and data sources

So far only the focal variable, income, and its definition have been examined. But other basic methodological choices may affect comparisons of income inequality across countries or over time (Chapter 3; Atkinson and Brandolini 2001). First, the reference unit may be the *household*, the inner family, the tax unit, or the individual income earner. The broader the definition of household, the more measured inequality tends to decrease, since the dispersion of individual incomes is abated by their aggregation and supposedly egalitarian distribution among all members of the unit (Redmond 1998). Second, observations may be adjusted for the size (s) and the composition of the reference unit in order to take into

⁴ According to preliminary calculations by Garfinkel, Rainwater and Smeeding (2007: Chapter 5), combining the pro-poor effects of non-cash benefits with the pro-rich effect of income from capital would more or less net out in the United States in 2004.

consideration the economies of scale generated by cohabitation by using an equivalence scale. Eurostat recommends the use of the modified OECD scale which assigns value 1 to the first adult, 0.5 to any other person aged 14 or older, and 0.3 to each child younger than 14. Atkinson, Rainwater and Smeeding (1995) define equivalent income as household income divided by the number of equivalent persons $s^{0.5}$, where 0.5 is a value that captures economies of scale. The choice of the equivalence scale considerably affects inequality comparisons (Buhmann *et al.* 1988; Coulter, Cowell and Jenkins 1992). Third, the welfare weighting of the single observations may vary: each observation may receive a weight of one (household-weight) or may be weighted according to its size (person-weight) or its size and composition (equivalent adult-weight) (Danziger and Taussig 1979; Ebert 1997).

There are other factors that impinge on data comparability. People who are present for only part of the year, on account of entering or leaving the population, may be excluded, or treated differently from other units. Data may be bottom- and top-coded, either in the course of the collection of the data as in the US Current Population Survey (Ryscavage 1995), or as a decision of the researcher to reduce the noise that is typically concentrated in the tails of the distribution (Cowell and Victoria-Feser 1996; Burkhauser, Feng and Jenkins 2007). The estimated Gini index may be understated where it is computed on observations that are ranked on a different basis from the variable of concern.

The last cause of limited comparability may be attributable to differences in the source of data. Income data are available both from national household surveys, and from administrative archives. Of these, the most important are income tax records, which have historically provided long runs of continuous data, recently exploited in the literature on top incomes (Chapter 7; Atkinson and Piketty, eds, 2007). Income tax records suffer from potentially serious problems, among which the incomplete coverage of those with incomes below the tax threshold and the tendency to under-report certain types of income. Household

surveys are also subject to problems, including the sampling error, which depends on the size and structure of the sample, and the non-sampling errors, caused by non-response and under-reporting (Atkinson, Rainwater and Smeeding 1995: Chapter 2). For these reasons, the upper tail of the income distribution tends to be unsatisfactorily covered in sample surveys, unless the rich are over-sampled; in a sense, the survey-based evidence discussed later in this Chapter may be seen as being about the incomes of, say, the bottom 99 percent of the population, and it is thus complementary to the results on high incomes based on tax records reported in Chapter 7.⁵

All these factors need to be kept in mind in the analysis of the national trends in income inequality or in cross-national comparisons. While the data include a great deal of “noise” or possibly unknown errors, the important assumption is that the signal derived from the analysis exceeds the noise for most careful analyses which also include sensitivity test of assumptions (Atkinson, Rainwater and Smeeding 1995; Gottschalk and Smeeding 2000).

In some major sense full comparability is an impossible goal. Surveys within countries as well as across countries are subject to changes in methods, and are characterized by differences in sampling and non-sampling errors. Comparability is vastly increased when the researcher can access the individual observations on household incomes available in a national archive, or in international databases where the original databases are harmonized such as the Luxembourg Income Study (LIS) and the European Union Statistics on Income and Living Conditions (EU-SILC).⁶ The degree of comparability is lessened substantially, but

⁵ Indeed, in the United States the most comprehensive source on the distribution of household incomes is most likely the series estimated by the US Congressional Budget Office (2007) by combining income tax records and household survey data; however, information is available only in highly aggregated published form.

⁶ The LIS project began in 1983 with the objective of creating a micro-database containing social and economic data collected in household surveys from different countries (Smeeding 2004). The database currently contains information for 30 countries for one or more years over the period 1967-2004 (see <http://www.lisproject.org>). EU-SILC has succeeded the European Community Household Panel (ECHP) in providing comparative statistics on income distribution and social exclusion at the European level (Clemenceau and Museux 2007). In 2005 it

the major characteristics of underlying data are often available in published material either from an original national source, or from secondary sources like that assembled at the World Bank by Deininger and Squire (1996) or the World Income Inequality Database (WIID-2b) compiled at the United Nations University-World Institute for Development Economics Research (2007). Chapter 24 makes use of these and other secondary data sources.

3. Empirics of Income Distribution

Cross-national comparisons of market income

Market income is the total revenue from labor and investments, and constitutes the primary source of household income. The inequality of its distribution reflects the dispersion of wages and salaries among employees, which is extensively discussed in Chapters 8 to 12, as well as the unequal distribution of wealth, as measured by the annual flow of return, which is examined in Chapter 6. But market income inequality is also influenced by the way earnings from self-employment or job positions are spread across the population. In order to gauge how these different distributions combine to produce the overall degree of inequality of market incomes, it is useful to decompose the Gini index by income source (Pyatt, Chen and Fei 1980).⁷ The Gini index G can be factorized as $G = \sum_k (\mu_k / \mu) G_k R_k$, where μ is mean income, μ_k and G_k are the mean and the Gini index of income component k , with $\mu = \sum_k \mu_k$, and $R_k = \text{cov}[y_k, r(y)] / \text{cov}[y_k, r(y_k)]$ is the “rank correlation ratio”, with $r(y)$ being the rank of

covered the 25 EU member states plus Norway and Iceland; it is being extended to Bulgaria, Romania, Switzerland and Turkey (see http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1913,47567825,1913_58814988&_dad=portal&_schema=PORTAL). New comparable longitudinal household income panel datasets provide the opportunity to observe individual household income dynamics, though for a much smaller number of countries (see Chapter 21).

⁷ Note, however, Shorrocks’ (1983) observation that this decomposition is somewhat arbitrary being only one of an infinite variety of potential rules.

households according to market income y (subscript k denotes the income component). The rank correlation ratio is equal to unity only if $r(y_k)=r(y)$, that is if households have the same ranking with respect to y_k and y . The Gini index for income component y_k can, in turn, be written as $G_k=(1-q_k)+q_kG_k^+$, where q_k is the share of households with a positive value of y_k and G_k^+ is the Gini index for the distribution of y_k among its earners rather than across the entire population as for G_k . The results of the decomposition of the Gini index for the distribution of market incomes among persons are reported in Table 1 for seven countries in 1999-2000, selected from the LIS database. These countries represent different welfare regimes according to the classification of Chapter 25. In order to facilitate the comparison with the figures for disposable incomes discussed later, all incomes are equalised.⁸

In all countries wages and salaries account for by far the greatest fraction of market income (column [1]). Except in Sweden, the share of income from self-employment is not negligible; it exceeds a fifth of the total in Taiwan. Property incomes, which do not include imputed rents for owner-occupied houses, account for about a tenth of market income, but are insignificant in Poland. The rank correlation ratios are all positive and close to one for wages and salaries, suggesting that the ordering of households in terms of this income component is very similar to that in terms of market income (column [2]). The Gini index for wages and salaries is higher in Germany, Poland and the United Kingdom than in Finland, Sweden and, somewhat surprisingly, the United States (column [3]). This ranking reflects the lower share of persons living in households with wage-and-salary-earners exhibited by the first three countries (column [4]): when the Gini index is calculated among these persons only, the

⁸ All LIS estimates in this Chapter use the square root of the household size as equivalence scale (e.g., the equivalent income of a household of four is obtained by dividing total household income by two). This value is then attributed to each person in the household to derive the distribution among persons. To minimize the impact of outliers all records with zero disposable income are dropped, and observations are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Changes in disposable income due to bottom- and top-coding are entirely attributed to market income.

highest inequality is found in the United States (column [5]).⁹ Between 73 percent (Taiwan) and 91 percent (Sweden) of the overall inequality of market incomes is explained by wages and salaries.

Figure 1 compares the inequality of market incomes across persons in 16 nations in 2000, or the closer available year. Poland, Israel and the United Kingdom exhibit the highest concentration of market incomes, with values of the Gini index above 50 percent; at the other end, Taiwan, the Netherlands and Romania show values below 40 percent. There appears to be no clear geographical pattern, differently from disposable income, as shown below. Using the decomposition described earlier, $G=(1-q)+qG^+$, the inequality of market incomes G rises both with the exclusion of people from the labor or asset markets (a lower value of q) and with the concentration of market incomes among those who receive them (a higher value of G^+). Figure 1 confirms that the overall market income inequality tends to be higher where the share of persons with positive market income, shown by the horizontal lines, is lower.

Figure 2 considers the national trends in six countries for which data are available: Canada, Finland, Sweden, West Germany,¹⁰ the United Kingdom and the United States. Reported series are internally consistent, but their levels are not comparable across nations, as the exact definition of market income may differ. For instance, the series for the United States and Sweden, in the more recent period, include realized capital gains, while the others do not. In five of the six countries, the inequality of market income inequality increased during the 1980s and early 1990s and remained substantially stable afterwards; in West Germany inequality increased only in the 1970s.

⁹ This measure of inequality differs from the measures of annual earnings dispersion across employees discussed in Chapter 8 because it aggregates all wages and salaries earned in a year by a household, expresses them in equalised terms, and then attributes the result to all household members.

¹⁰ Throughout the paper Germany refers to the Federal Republic of Germany after re-unification in 1991, while West Germany refers to the Federal Republic of Germany until 1990 and to the Western Länder thereafter.

Cross-national comparisons of disposable income

Money disposable income is obtained from market income by adding inter-households cash transfers and public transfers, and by subtracting taxes and employees' social insurance contributions. Figure 3 compares the distribution of equivalent disposable income across persons in the 16 nations examined before plus 16 other nations. These figures are calculated from the LIS database except for Portugal, which is estimated from the ECHP database (Waves 1-8, December 2003), and Japan, which was computed according to the same methodology as all other figures by Ishikawa (1996) (see Gottschalk and Smeeding 2000). Following World Bank (2005) categorization, countries are separated into high-income and middle-income economies according to their per capita gross national income in 2004.

There is a wide range of income inequality among the nations of Figure 3. The United States is an outlier among rich nations, and only Russia and Mexico, two middle-income economies, have higher levels of inequality. A low-income American at the 10th percentile has an income that is only 39 percent of the median income (P10). By contrast, in most countries of central, northern and eastern Europe the income of the poor exceeds 50 percent of the income of middle-income person; in the other English-speaking nations and in the southern European countries, plus Israel, it is 42 percent or more. Only in Russia and Mexico do the poor fare relatively worse than in the United States. In Greece, Portugal, Spain, Israel as well as the United States and the United Kingdom the rich persons, those at the 90th percentile, earn more than twice the national median incomes (P90). In poorer countries the 90th percentile can also be very high in relative terms: e.g., Mexico, Russia, and Estonia.

The countries in Figure 3 fall into some distinctive clusters. Inequality, as measured by the decile ratio (the ratio between P90 and P10), is least in Nordic countries, the Netherlands and the Czech and Slovak Republics with values of 3 or less. The other Benelux countries

(Belgium and Luxembourg), those from central Europe (France, Switzerland, Germany, Austria, Slovenia) and two from eastern Europe (Hungary, Romania) come next at 3.2-3.4. These precede the four English-speaking nations (Canada, Australia, Ireland and the United Kingdom), which have decile ratios comprised between 4.2 and 4.6, and the southern European countries (Italy, Spain, Greece and Portugal) and Israel, whose ratios fall between 4.5 and 5. Only the United States, Estonia, Mexico and Russia have values in excess of 5. With decile ratios around 4, the two Asian countries, Taiwan and Japan, are in an intermediate position.

Inequality differs much more across middle-income than high-income economies. While Estonia, Russia and Mexico show a very unequal distribution of income, the other five countries, all from eastern Europe, exhibit moderate or low levels of inequality. The shape of the income distribution was noticeably different across these formerly planned economies already in the mid-1980s, before they turned into market economies, with Czechoslovakia showing the least inequality and the Soviet Union the highest (Atkinson and Micklewright 1992).

In Figure 3 countries are arranged, within the two categories of high-income and middle-income, by the decile ratio, from lowest to highest. This country rank order does not coincide with that based on the other statistics reported in the same figure: P10, P90 and the Gini index. While these differences may be small and are likely to be within the bounds of sampling error, one should still be aware that the exact ranking of countries in international comparisons may well depend on which part of the distribution is analyzed: different summary measures may lead to different orderings, as they weight differently the top and the bottom of the distribution (see Chapter 3; Burkhauser, Feng and Jenkins 2007). In the same vein, also the results of empirical tests are sensitive to the choice of the inequality index, as shown by Voitchovsky (2005) for the relationship between inequality and growth (see also

Chapter 22), and by Schwabish, Smeeding and Osberg (2006) for the relationship between inequality and social spending.

A more robust, if partial, ranking is provided by comparing the entire income distributions through the analysis of Lorenz dominance as developed by Atkinson (1970) (see Chapter 3). By summarizing by means of a Hasse diagram the complex pattern of bilateral comparisons which arise for the same 32 countries considered here, Brandolini and Smeeding (2008) show that many of such comparisons are indeed ambiguous, unless a specific inequality index is chosen. At the same time, they confirm the basic pattern sketched above using the decile ratio: Mexico and Russia are at the top of the inequality ranking, followed by the English-speaking countries intertwined with the southern European countries, then by the other continental European nations, with the Nordic countries at the bottom of the scale; eastern European countries are spread along the entire tree.

The analysis has been conducted so far in relative terms; that is each citizen's income has been compared to the incomes of his or her national compatriots. However, average income differs across countries. The United States resident is, "on average", better off than are residents of Italy, because the US real Gross Domestic Product (GDP) per capita in 2000 is \$34,100 international dollars, compared to \$25,800 international dollars in Italy (International Monetary Fund 2007). Does this higher average US standard of living extend to all levels of the income distribution? In order to answer this question, one must compare *real incomes*, that is incomes deflated by a Purchasing Power Parity (PPP) index. This is a standard, but crude, way of measuring the amount of goods and services that a certain income can purchase. On the one hand, it is questionable that the same conversion factor should be applied across the entire distribution, although the same concern could be raised for within-country differences in the cost of living. On the other hand, real disposable income does not account for goods and services such as education and health care that are provided at different

prices and under different financing schemes in different nations. As low-income citizens in some countries need to spend more out of pocket for these goods than do low-income citizens in other countries, their living standard is relatively lower than that measured by PPP-adjusted income (Smeeding and Rainwater 2004). Further complications arise because the PPP indices are available for various aggregates and from different sources,¹¹ and are computed for national accounts, which are intrinsically different from survey data (Deaton 2005).¹²

The statistics for real equivalised incomes in 2000 international dollars are reported in Figure 4. Original incomes are adjusted by the national consumer price indices in the case of non-base year observations, and are converted by means of PPP indices for GDP drawn from International Monetary Fund (2007). In each country, the real P10, P90 and median are recomputed as a fraction of the US median real income.

Even if mostly rich nations are considered here, differences in average real living standards are extremely large. The median person in middle-income economies earns less than a third of the median American, and about a tenth as much in Russia. But the variation is considerable, even among “high-income economies”. Portugal, Slovenia and Greece have median real income which is half of less of the US value; only in Luxembourg the median is higher than in the United States. However, these differences do not necessarily carry forward to the rest of the income distribution. If the living standard of the median Swede or Finn appears to be about 70 percent of that of the median American, the living standard of the poor

¹¹ PPP indices are routinely estimated by various international agencies, such as the Organisation for Economic Co-operation and Development or the World Bank, or international research projects like the Penn World Table (Summers and Heston 1991); moreover, they are computed for various national accounts aggregates, like GDP or household final consumption expenditure (Bradbury and Jäntti 1999). Methods to estimate PPP indices also differ, as discussed for instance by Dowrick and Akmal (2005).

¹² This difference shows up in sizeable shortfalls of total survey incomes from GDP aggregates (Brandolini 2007). As these shortfalls vary across countries, comparisons of living standards based on survey means may differ from those based on national accounts, although the correlation between per capita GDP and survey disposable income per person is positive, if less than one. The comparisons of real incomes discussed below would be affected should household-level data be aligned to aggregate statistics.

in Sweden and Finland is roughly the same as in the United States, around 39 percent of the US median. Low-income people in Denmark, Norway, the Netherlands, Switzerland and, especially, Luxembourg are much better off than elsewhere. In all southern European countries but also, to a lesser extent, in Australia, Ireland and the United Kingdom, the living standards of low-income households are lower than in the United States. Of course, they are a great deal lower in all middle-income economies. At the other extreme, the rich Americans far surpass the rich in any other nation observed, save for the Luxembourgers. For instance, the rich American is almost 50 percentage points above the rich Canadian and the rich Briton. The horizontal bars in Figure 4 are proportional to the absolute distance between top and bottom incomes. The absolute gap in the United States is 1.5-1.7 times those in Switzerland, Taiwan, Canada and the United Kingdom, and is much higher than in any of the remaining countries except Luxembourg. The United States enjoys the world's highest living standard as well as the greatest absolute inequality between the rich and the poor among developed countries.

Figures 3 and 4 offer a snapshot of income inequality around the turn of the century. However, as is well-known, inequality has increased considerably in last decades in several countries, prominently in the United States and the United Kingdom (Gottschalk and Smeeding 1997, 2000; Brandolini and Smeeding 2008). Thus, Figure 5 summarizes the evidence at our disposal on long-run patterns in eight rich countries: three Anglo-Saxon nations (Canada, the United States, and the United Kingdom), two Nordic nations (Finland and Sweden) and three continental European countries (the Netherlands, West Germany, and France). As noted before, reported series are a selection of those internally consistent for a sufficiently long span of time, and they are not necessarily comparable across nations. In order to make the picture more readable, some broken series are joint by simply adding to the initial piece of the time series the difference in the overlapping year.

The main conclusion from Figure 5 is that national experiences varied during the last four decades and there is no one overarching common story. There was some tendency for the disposable income distribution to narrow until the mid-1970s. Then, income inequality rose sharply in the United Kingdom in the 1980s and in the United States in the 1980s and 1990s, and still continuing more slowly through the 2000s. But inequality rose more moderately in Canada, Sweden, Finland and West Germany in the 1990s. Moreover, the timing and magnitude of the increase differed widely across nations. Inequality did not show any persistent tendency to rise in the Netherlands (bowl shaped trend), and may even have decreased in France.

Changes in inequality do not exhibit clear trajectories, but rather irregular movements, with more substantial changes often concentrated in rather short lapses of time. Together with the lack of a common international pattern, this suggests to look at explanations based on the joint working of multiple factors which sometimes balance out, sometimes reinforce each other, rather than to focus on explanations centered on a single cause like de-industrialization, skill-biased technological progress, or globalization. Identifying and characterizing episodes and turning points in the dynamics of inequality may reveal more fruitful than searching for overarching general tendencies.

Cash and non-cash redistribution

Even a cursory comparison of the inequality indices for market and disposable income reveals a large equalizing impact of public redistribution. But the size of the impact and the way in which it is achieved vary from country to country. For the same seven countries included in Table 1, Table 2 shows how the distribution of market incomes is turned into the distribution of disposable incomes by subtracting taxes and social contribution and adding social insurance and assistance benefits, and private inter-household transfers. Both public

transfers and taxes are much higher in Sweden, Finland and Germany than in the United Kingdom and the United States (column [1]), an indication of the different welfare regimes emphasized in Chapter 25. In all five countries, however, the rank correlation ratio is close to one for taxes and contributions, as a consequence of their strict relationship with income, and negative for public transfers, signaling some targeting to lower-income households (column [2]). Targeting appears to be especially pronounced in the United Kingdom, and limited in the United States. Poland exhibits the largest proportion of public transfers in disposable income, despite the low tax incidence, while Taiwan has the least redistributive public intervention; in both countries, there is no evidence of targeting in social protection, and the share of private inter-household transfers is sizably larger than in the other five nations. In all seven countries taxes and social contributions appear to be the main factor behind the reduction of income inequality, but also transfers play a role in Finland, Sweden and the United Kingdom (columns [6] and [7]).

A common synthetic “output” measure of the level of redistribution is constituted by the difference between the Gini index for market incomes and the Gini index for disposable incomes. This difference provides only a crude estimate of the actual degree of public redistribution. First, the implicit assumption that market income inequality would remain the same if taxes and benefits did not exist is clearly unrealistic, since it ignores how taxes and benefits encourage, or discourage, earnings or savings. Second, this measure disregards the different impact of programs designed to achieve redistribution: universal benefits, targeted means-tested assistance, or social insurance schemes (see also Mahler and Jesuit 2006; Smeeding 2006). Third, it only accounts for cash and near-cash programs, paying no attention to redistribution carried out via non-cash programs. Ideally, one would like to know how people would behave in a different environment with no taxes and benefits, or different assistance schemes, but this would require bold assumptions and a rather complex data-based

behavioral micro-simulation model, or a more abstract computable general equilibrium model (Boadway and Keen 2000). On the contrary, the difference in the Gini indices for market and disposable incomes is an intelligible, if imperfect, way to gauge the level of income redistribution in a country.

As shown by LIS data, in all 16 nations reported in Figure 6 disposable incomes are more equally distributed than market incomes, confirming that the direct tax and cash benefit system narrows the overall distribution. On average, inequality falls by about a third, from a Gini index of 45 to one of 29 percent. Cross-country variation in original inequality is wider than after redistribution: the Gini index ranges from 33 to 53 percent for market incomes, and from 23 to 37 percent for disposable incomes. The United States has the highest inequality of disposable incomes, although the dispersion of market incomes is on the high side but not far from most other countries; it is as high as in Germany and Australia and below the values recorded for the United Kingdom, Poland and Israel. The fact is that in the United States the percentage reduction in inequality brought about by taxes and benefits is a mere 23 percent, the lowest value in the Figure, excluding Taiwan where redistribution has a tiny impact.

These percentage reductions are very consistent with the patterns of aggregate public expenditure (see Smeeding 2005 about non-elderly spending). High-spending northern and central European nations have the highest degree of inequality reduction, from 39 to 48 percent; the Anglo-Saxon (excluding the United States) nations and Israel are next with 28 to 34 percent reductions; Switzerland and Romania follow at 30 percent or less, and the United States and Taiwan are, as just seen, at the bottom of the scale. The degree of redistribution in southern Europe is lower than in Ireland and the United Kingdom, especially if public pensions are not included among transfers, according to the EUROMOD estimates based on micro-simulations rather than the records of the original micro-data sources (Immervoll *et al.* 2006). The nations that redistribute the most are not necessarily those with the greatest degree

of market income inequality: before-tax-and-benefit incomes in Denmark and Norway are far more equally distributed than in the United States. In fact, Schwabish, Smeeding and Osberg (2006) find almost no correlation between the P10 value for market income and the level of social spending. Lindert (2004) provides historical evidence that higher social spending is positively correlated with longer term economic growth trends.

When time trends are considered, the redistributive impact of tax-and-transfer systems appears to have evolved differently across nations. Time patterns for six countries are shown in Figure 7, again by looking at the absolute difference between the Gini index for market income and that for disposable income. Note that these time series also reflect national practices and so the level of redistribution is not completely comparable across nations. What emerges is that the redistributive impact of taxes and transfers initially increased and then stabilized or dropped in all countries except for the United States, where it remained quite stable over time (but the series starts only in 1979). The United Kingdom stands out for having the most dramatic switch of regime, as in the early 1980s it apparently shifted from a situation not too different from the two Nordic countries to a model closer to that of the two North American countries. It is not possible to infer from this simple measure whether changes in redistribution are the automatic response of a progressive tax-and-benefit system to changes in the distribution of market incomes, or are instead the product of explicit policy choices (Atkinson 2004). Nevertheless, they confirm that a widening of the market income distribution need not result in a drastic increase in the inequality of disposable incomes. Rising levels of redistribution in Finland, Sweden, and to a lesser extent Canada – where policies have been increasingly targeted to the poor – have been more effective in muting increasing market income inequality than have stable but low levels of redistribution in the United States, though periods do matter.

As already said, none of these estimates include benefits in-kind or indirect taxes. How much difference do they make? In their study of the distribution in seven rich countries in the early 1980s, Smeeding *et al.* (1993) found that including the value of non-cash benefits in household income reinforced the redistributive impact of cash tax-and-transfer mechanisms in all countries, but did not affect markedly the pattern of national differences in income inequality from that which emerged from the analysis of cash income alone. More recent analysis for ten rich countries in the late 1990s by Garfinkel, Rainwater and Smeeding (2006) confirms the egalitarian impact of non-cash redistribution. After augmenting income to include the value of non-cash benefits for health care and education net of both direct and indirect taxes, the income of the poor turns out to be much closer to the median and the distance between the rich and the poor falls in all countries, except Belgium and Finland. Changes are largest among the English-speaking nations, with the United States showing the greatest drop in the decile ratio. Differences across countries appear to shrink considerably.

Two reasons can account for these results. First, compared to other advanced nations, the English-speaking nations tend to be short on cash and long on in-kind benefits. Thus relatively equal non cash benefits can go a long way toward equalizing command over total resources, including more unequally distributed cash benefits and other incomes. Second, these countries rely less heavily than the big spending national welfare states on indirect taxes and taxation of cash benefits. Together, these two factors explain the big shift when moving from cash disposable income to augmented income.

These results are to be taken with caution, because they depend crucially on the assumptions made to evaluate and impute non-cash benefits. While this caveat has to be borne in mind, it is clear conceptually that these benefits are worth some nontrivial amount to both rich and poor alike. Empirically, health and education transfers are as large as or a much larger part of what the welfare state does for families than are the provision of cash benefits in

all nations. This fact must be taken into consideration in studying the relative effectiveness and generosity of all welfare states, and their effect on inequality.

Finally, the after tax and transfer disposable income figures presented above often implicitly include the benefits of “tax expenditures” (deductions from the income tax base for some actions such as payment of mortgage interest on owed homes, or deferring income on contributions to pensions) or differentially lower tax rates on certain types of incomes such as income from capital. In many countries such benefits rise with tax rates and primarily benefit the well to do in the highest tax brackets, even though these benefits cannot be shown as redistribution in the analyses above.

4. Conclusions and Further Research

The measurement of the distribution of living standards among households or persons is a demanding task that poses both conceptual and practical problems, from the choice of the focal variable to its precise definition, from the decision about the reference unit or the equivalence scale to the understanding of the impact of sampling and non-sampling errors. The emphasis on the importance of these problems in the first part of this Chapter is not meant to discourage research in this field, but it is rather a strong recommendation to take them seriously before drawing conclusions from empirical analysis.

The evidence presented in the Chapter shows that around the beginning of this century, the United States had the highest level of disposable income inequality among high-income economies, while central and, especially, northern European countries had the lowest levels. Only in Russia and Mexico, two middle-income economies, was disposable income more unequally distributed than in the United States. The US result is less due to the high concentration in the distribution of market incomes than to the effects of taxes and benefits in

reducing market income inequality. The redistributive impact of the government, as captured by the difference between the Gini indices for market and disposable income, is substantially larger in continental and northern European countries. Lastly, no common trend in disposable income inequality is observed since the 1970s across rich nations. However, the overall tendency in the last twenty years has been for an increase in both disposable and market income inequality in the large majority of rich nations.

While some major patterns are clear across and within nations, a great deal of work remains. Amongst the challenges facing researchers are improved measures of income from capital and wealth, more robust trend data for a wider range of rich nations. More comparable data in the LIS style for the fast growing middle income countries—including China and India, for instance—would greatly widen the scope of inquiry and add to our basis for assessing the impacts of trade and global economic change on inequality in a comparable format. Finally, attempts to model and understand causal factors and explanations for differences in level and trend in income inequality across nations is the ultimate challenge to which researchers on inequality should all aspire.

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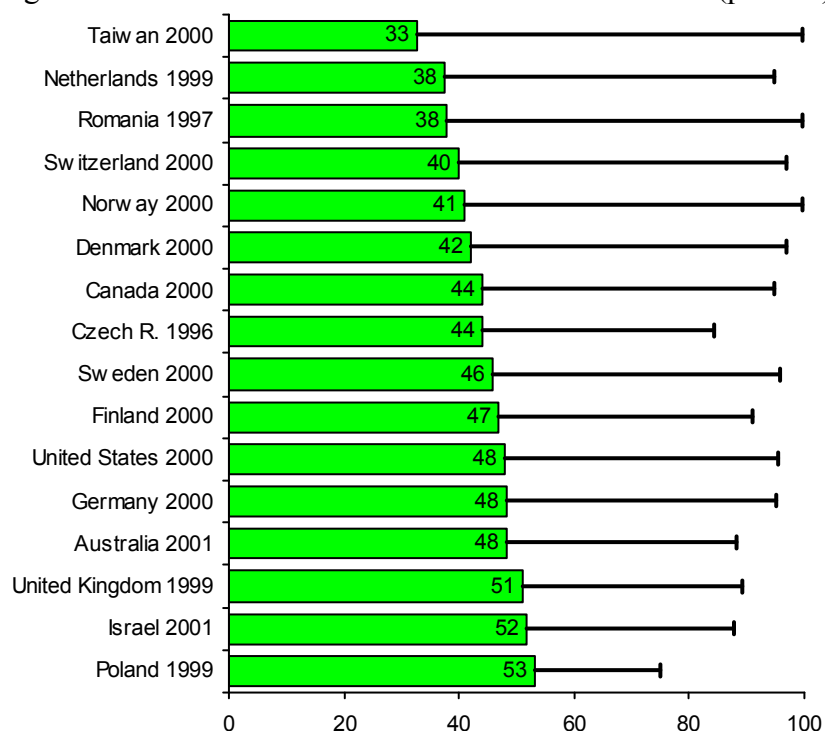
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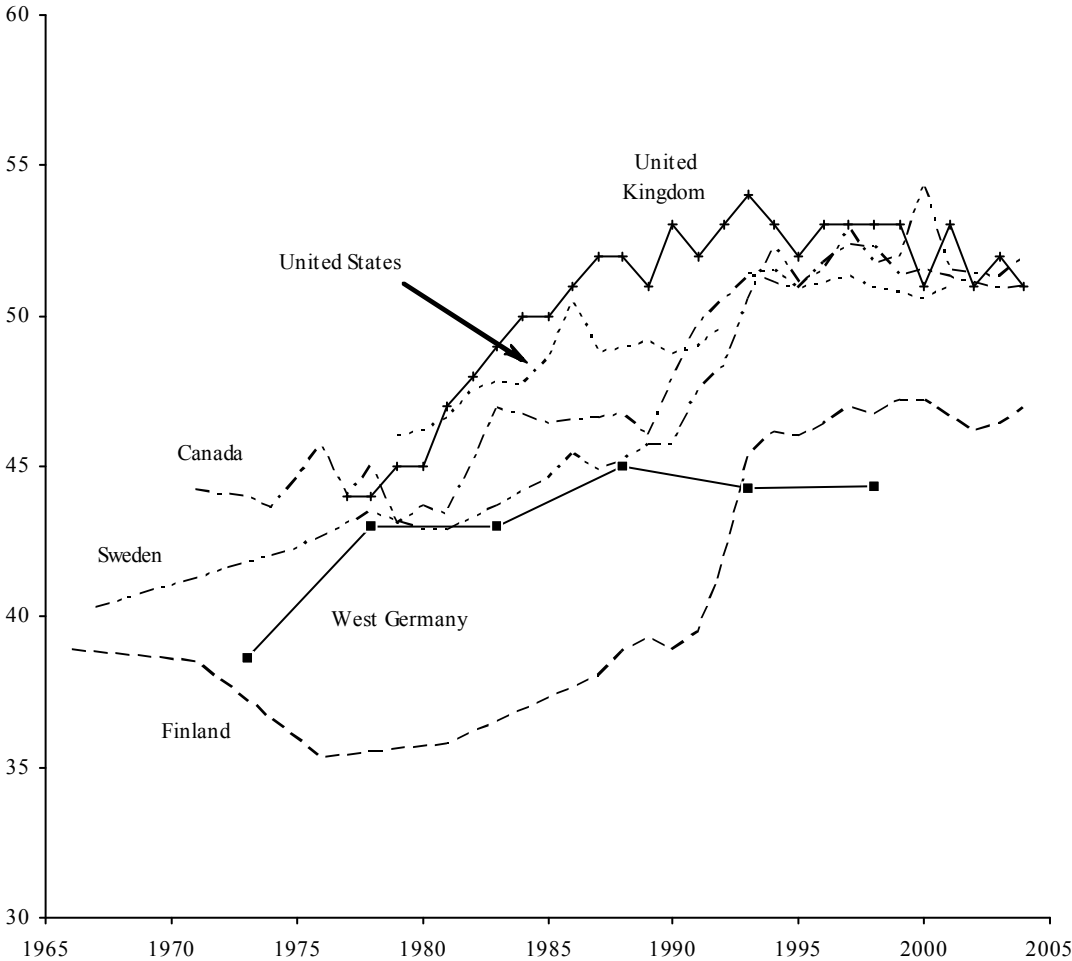
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Figure 1. Gini indices of market income in 16 countries (percent)



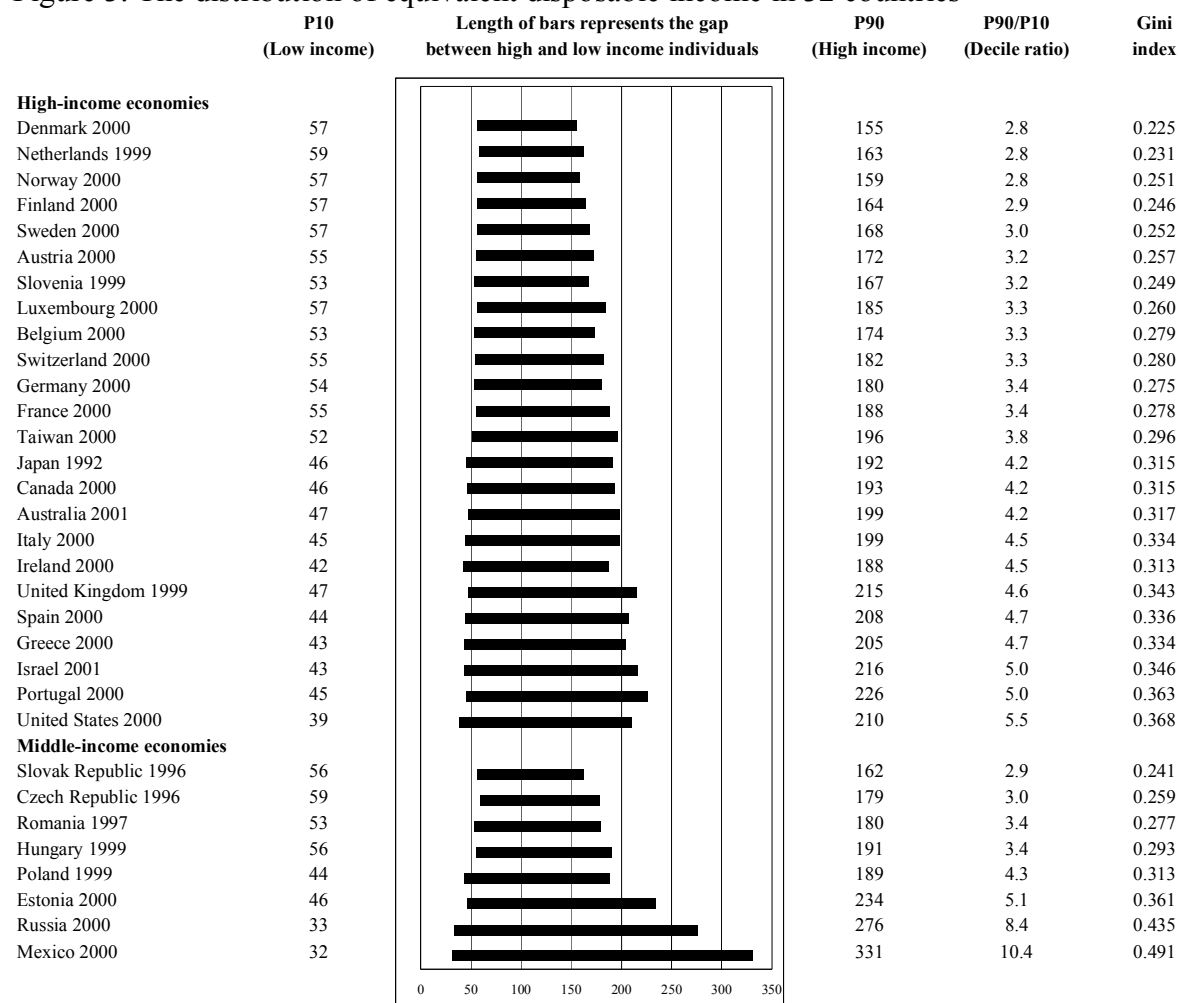
Source: Authors' calculations from the Luxembourg Income Study database, as of 20 February 2008. Observations for disposable income are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Changes in disposable incomes due to bottom- and top-coding are entirely attributed to market incomes. Market incomes are adjusted for household size by the square-root equivalence scale. Horizontal lines indicate the share of households with positive market income.

Figure 2: Gini index of market income (percent)



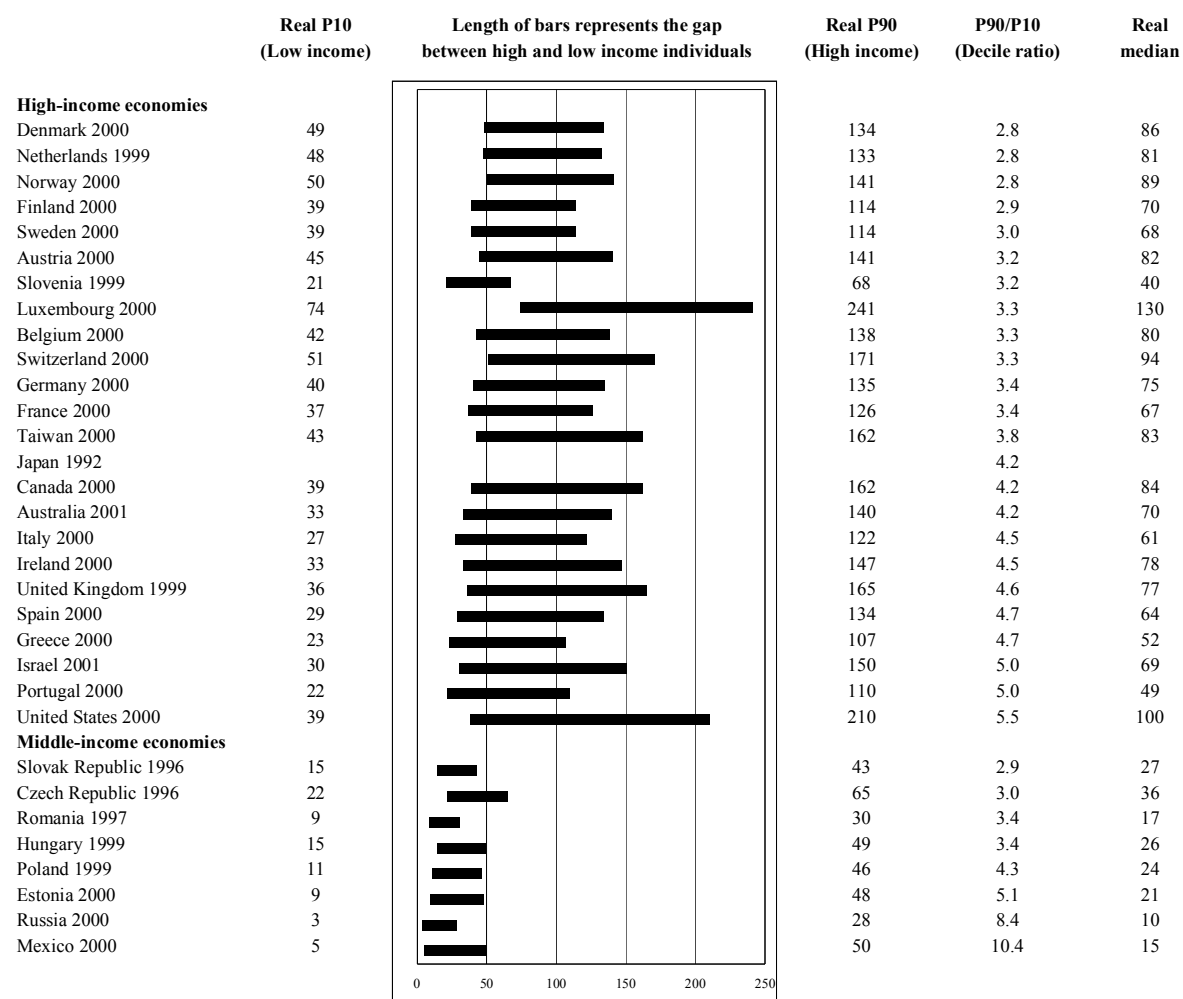
Source: Brandolini and Smeeding (2008). To facilitate reading, a break in each of the series for Canada, Sweden and the United Kingdom is eliminated by scaling up or down the figures before the discontinuity by the difference in the first overlapping year.

Figure 3. The distribution of equivalent disposable income in 32 countries



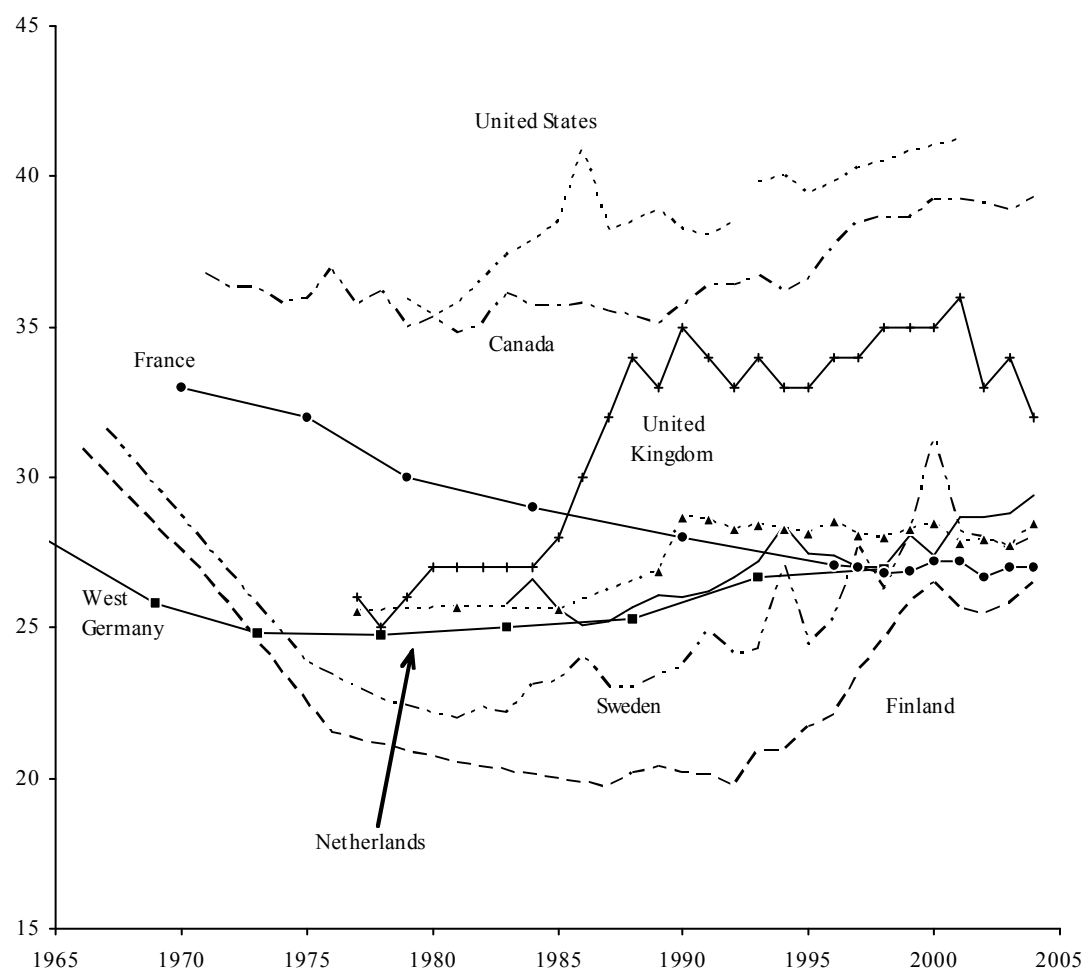
Source: Authors' calculations from the Luxembourg Income Study database, as of 20 February 2008 (figures coincide with those reported in <http://www.lisproject.org/keyfigures/ineqtable.htm>), and for Portugal from the European Community Household Panel database (Waves 1-8, December 2003); statistics for Japan were computed according to the same methodology as all other figures by Ishikawa (1996) for Gottschalk and Smeeding (2000). P10 and P90 are the ratios to the median of the 10th and 90th percentiles, respectively. Observations are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Incomes are adjusted for household size by the square-root equivalence scale. Economies are classified by the World Bank (2005) according to 2004 per capita gross national income in the following income groups: low-income economies (LIC), \$825 or less; lower-middle-income economies (LMC), \$826–3,255; upper-middle income economies (UMC), \$3,256–10,065; and high-income economies (HIC), \$10,066 or more.

Figure 4. The distribution of real disposable income in 32 high- and middle-income economies



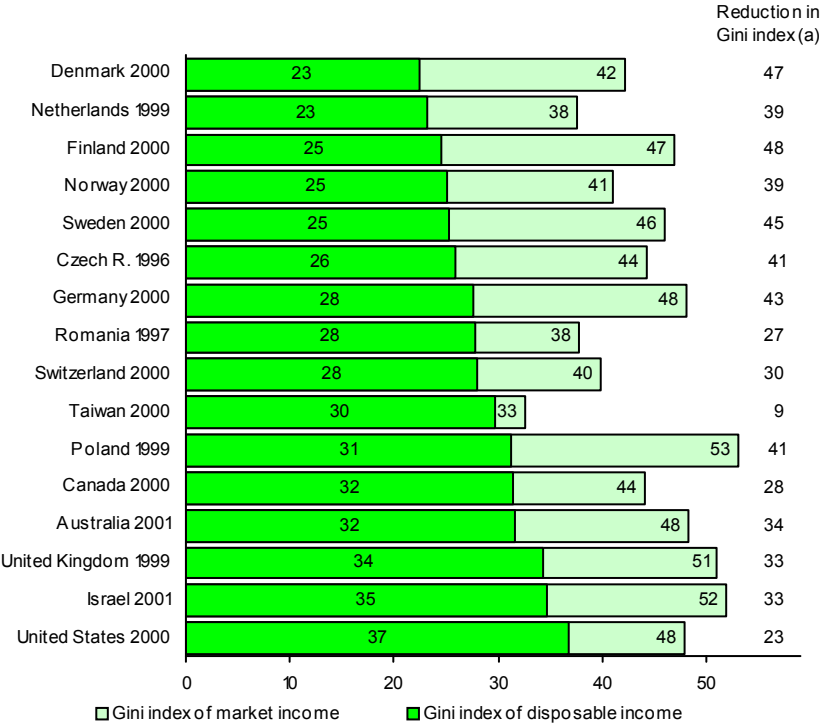
Source: Authors' calculations from the Luxembourg Income Study database, as of 20 February 2008, and for Portugal from the European Community Household Panel database (Waves 1-8, December 2003); statistics for Japan were computed according to the same methodology as all other figures by Ishikawa (1996) for Gottschalk and Smeeding (2000). Real P10 and P90 are the percentage ratios to the US median of the 10th and 90th percentiles, respectively; real median is expressed as a percentage ratio of the US median. Observations are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Incomes are adjusted for household size by the square-root equivalence scale. Consumer price indices and purchasing power parity conversion factors from local currency units to international dollars are from International Monetary Fund (2007).

Figure 5: Gini index of disposable income (percent)



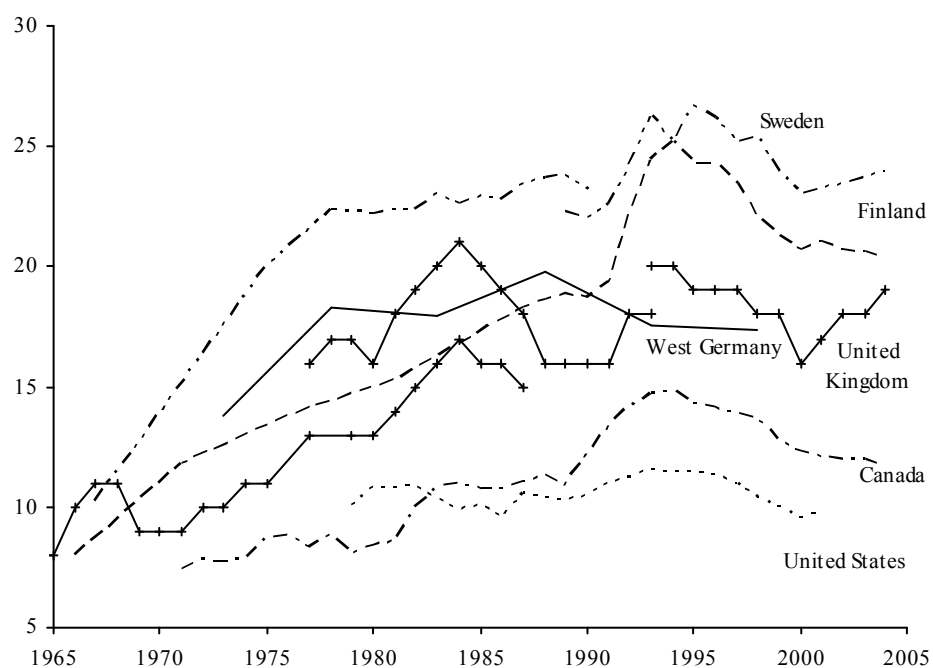
Source: Brandolini and Smeeding (2008). To facilitate reading, a break in each of the series for Canada, the Netherlands, Sweden and the United Kingdom is eliminated by scaling up or down the figures before the discontinuity by the difference in the first overlapping year.

Figure 6. Gini indices of market income and disposable income in 16 countries (percent)



Source: Authors’ calculations from the Luxembourg Income Study database, as of 20 February 2008. Observations for disposable income are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Changes in disposable incomes due to bottom- and top-coding are entirely attributed to market incomes. Both market and disposable incomes are adjusted for household size by the square-root equivalence scale. (a) Difference between the Gini index for market income and the Gini index for disposable income, expressed as a percentage of the former.

Figure 7. Equalizing effect of taxes and transfers: absolute difference between the Gini index of market income and the Gini index of disposable income (percent)



Source: Brandolini and Smeeding (2008). Unadjusted incomes for Canada, the United Kingdom (1961-1987) and the United States; equivalent incomes for Finland, Sweden, West Germany and the United Kingdom (1977-2004).

Table 1. Decomposition of the Gini index of market income by income source in seven countries

Income source	Share on market income (%)	Rank correlation ratio	Gini index	Population share with positive value (%)	Gini index for population with positive value	Absolute contribution	Relative contribution (%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Finland 2000							
Wages and salaries	83.1	0.910	0.501	79.2	0.370	0.379	80.7
Self-employment income	9.2	0.513	0.934	18.3	0.638	0.044	9.3
Property income (a)	7.8	0.645	0.929	50.7	0.860	0.047	9.9
Market income	100.0	1.000	0.469	90.9	0.416	0.469	100.0
Germany 2000							
Wages and salaries	80.2	0.874	0.531	73.8	0.364	0.372	77.3
Self-employment income	11.6	0.674	0.942	11.3	0.482	0.074	15.3
Property income (a)	8.2	0.501	0.858	83.9	0.830	0.035	7.3
Market income	100.0	1.000	0.481	95.1	0.454	0.481	100.0
Poland 1999							
Wages and salaries	86.5	0.914	0.565	68.0	0.360	0.447	84.3
Self-employment income	12.9	0.679	0.937	11.1	0.432	0.082	15.4
Property income (a)	0.7	0.223	0.990	2.1	0.529	0.001	0.3
Market income	100.0	1.000	0.530	74.9	0.373	0.530	100.0
Sweden 2000							
Wages and salaries	87.7	0.946	0.505	79.7	0.379	0.419	91.2
Self-employment income	3.0	0.345	1.303	11.8	3.578	0.014	2.9
Property income (a)	9.3	0.336	0.856	81.1	0.823	0.027	5.8
Market income	100.0	1.000	0.459	95.8	0.436	0.459	100.0
Taiwan 2000							
Wages and salaries	69.0	0.736	0.464	79.7	0.327	0.235	72.5
Self-employment income	21.1	0.298	0.783	37.4	0.419	0.049	15.1
Property income (a)	9.9	0.554	0.732	98.2	0.727	0.040	12.4
Market income	100.0	1.000	0.325	99.5	0.322	0.325	100.0
United Kingdom 1999							
Wages and salaries	78.1	0.895	0.582	68.5	0.389	0.406	79.9
Self-employment income	10.8	0.637	0.966	13.9	0.757	0.066	13.0
Property income (a)	11.2	0.374	0.868	72.2	0.817	0.036	7.1
Market income	100.0	1.000	0.509	89.3	0.450	0.509	100.0
United States 2000							
Wages and salaries	85.7	0.925	0.512	85.6	0.429	0.405	84.5
Self-employment income	6.3	0.610	0.983	12.0	0.862	0.038	7.9
Property income (a)	8.0	0.507	0.891	62.0	0.824	0.036	7.6
Market income	100.0	1.000	0.479	95.5	0.455	0.479	100.0

Source: Authors' calculations from the Luxembourg Income Study database, as of 20 February 2008. Observations for disposable income are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Changes in disposable incomes due to bottom- and top-coding are entirely attributed to market incomes, proportionally for each income component. Market incomes are adjusted for household size by the square-root equivalence scale. (a) Includes private pensions.

Table 2. Decomposition of the Gini index of disposable income by income source in seven countries

Income source	Share on disposable income (%)	Rank correlation ratio	Gini index	Population share with positive value (%)	Gini index for population with positive value	Absolute contribution	Relative contribution (%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Finland 2000							
Market income	105.3	0.877	0.469	90.9	0.416	0.433	175.9
Private transfers	1.1	0.096	0.905	25.9	0.635	0.001	0.4
Public social transfers	32.3	-0.188	0.550	88.1	0.489	-0.033	-13.6
Taxes, social contributions	-38.7	0.888	0.450	98.1	0.439	-0.154	-62.7
Disposable income	100.0	1.000	0.246	100.0	0.246	0.246	100.0
Germany 2000							
Market income	109.0	0.834	0.481	95.1	0.454	0.437	159.0
Private transfers	0.8	-0.255	0.975	4.8	0.467	-0.002	-0.7
Public social transfers	27.0	-0.026	0.606	81.5	0.517	-0.004	-1.5
Taxes, social contributions	-36.7	0.798	0.532	93.3	0.499	-0.156	-56.7
Disposable income	100.0	1.000	0.275	100.0	0.275	0.275	100.0
Poland 1999							
Market income	74.6	0.760	0.530	74.9	0.373	0.301	96.2
Private transfers	3.0	0.257	0.925	14.7	0.492	0.007	2.3
Public social transfers	36.5	0.200	0.610	73.2	0.467	0.044	14.2
Taxes, social contributions	-14.1	0.526	0.534	79.9	0.416	-0.040	-12.7
Disposable income	100.0	1.000	0.313	100.0	0.313	0.313	100.1
Sweden 2000							
Market income	109.0	0.906	0.459	95.8	0.436	0.453	180.2
Private transfers	0.8	-0.327	0.912	12.4	0.286	-0.002	-1.0
Public social transfers	33.6	-0.195	0.529	88.2	0.466	-0.035	-13.7
Taxes, social contributions	-43.4	0.958	0.396	97.9	0.383	-0.165	-65.5
Disposable income	100.0	1.000	0.252	100.0	0.252	0.252	100.0
Taiwan 2000							
Market income	101.1	0.971	0.325	99.5	0.322	0.319	107.7
Private transfers	4.9	-0.029	0.743	79.1	0.674	-0.001	-0.4
Public social transfers	4.3	0.139	0.541	98.6	0.535	0.003	1.1
Taxes, social contributions	-10.3	0.724	0.333	97.8	0.318	-0.025	-8.4
Disposable income	100.0	1.000	0.296	100.0	0.296	0.296	100.0
United Kingdom 1999							
Market income	107.3	0.923	0.509	89.3	0.450	0.504	146.9
Private transfers	1.2	0.189	0.973	6.4	0.577	0.002	0.6
Public social transfers	18.0	-0.442	0.593	76.8	0.469	-0.047	-13.7
Taxes, social contributions	-26.4	0.782	0.561	90.3	0.514	-0.116	-33.8
Disposable income	100.0	1.000	0.343	100.0	0.343	0.343	100.0
United States 2000							
Market income	117.2	0.947	0.479	95.5	0.455	0.532	144.4
Private transfers	1.1	0.138	0.957	10.5	0.588	0.001	0.4
Public social transfers	10.5	-0.007	0.778	49.4	0.550	-0.001	-0.1
Taxes, social contributions	-28.8	0.924	0.619	91.7	0.584	-0.165	-44.7
Disposable income	100.0	1.000	0.368	100.0	0.368	0.368	100.0

Source: Authors' calculations from the Luxembourg Income Study database, as of 20 February 2008. Observations for disposable income are bottom-coded at 1 percent of the mean of equivalent disposable income and top-coded at 10 times the median of unadjusted disposable income. Changes in disposable incomes due to bottom- and top-coding are entirely attributed to market incomes, proportionally for each income component. Both market and disposable incomes are adjusted for household size by the square-root equivalence scale.