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EMPIRICAL EVIDENCE ON INCOME INEQUALITY IN INDUSTRIALIZED COUNTRIES

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Empirical Evidence on Income Inequality in Industrialized Countries

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Abstract

This chapter reviews the evidence on cross-national comparisons of annual disposable income inequality in over 20 wealthy nations. We begin by reviewing a number of conceptual and measurement issues which must be addressed by any cross-national comparison of survey based household income data. With these caveats in mind, we present data on both the level of inequality during the early-to-mid-1990s, and trend in inequality since 1970. While most comparisons are made in terms of relative incomes within nations, we also make some real income comparisons at a point in time using purchasing power parities.

The data indicate that a wide range of inequality exists across these rich nations during this decade, with the most unequal nation experiencing a level of inequality which is more than twice the level found in the most equal nation. Country specific trends in income inequality are more similar, though not universally so. The large majority of nations have experienced rising income inequality over the last decade or longer.

This increase is not offset by changes in income mobility over this period, and follows a period of declining income inequality in most of these same nations.

JEL Classifications: D31, C81

1. Introduction

This paper reviews the empirical evidence on the level and trend in household[1] (family) income inequality in industrialized countries, primarily the OECD countries. How equally is income distributed across families in countries with very different labor market and social institutions? Has inequality increased in these countries as it has the United States? How do the recent changes compare to longer term trends in income inequality? Is the inequality levels of the 1990s appreciably different from those found in the 1970s or earlier?

Until recently, cross-national comparisons focused on differences in the standard of living of the average or typical person. The more recent literature on cross-national comparisons of inequality within each country allows direct comparisons of differences in well-being of persons throughout the distribution. What is the relative income of a household at the 10th percentile compared to the median household in the same country? How does this household compare to a household in a different country at the same point in that country's distribution of household income? For example, do households below the 20th percentile in the United States have a lower standard of living than comparable Swedish households?

This chapter builds on a number of chapters in this volume, particularly chapter 2, which presents a detailed discussion of alternative measures of inequality. Our focus on household income is broader than chapter 5's focus on distribution of earnings, although the two are closely related.[2] Our chapter is also closely related to chapter 6, which focuses on the levels and trends in poverty in advanced countries. While poverty can change for a variety of reasons, changes in the distribution of household income are a key component in explaining differences in trends in poverty across countries during the 1980s.

The material presented in this chapter is largely descriptive. It presents the patterns that any theory of household income distribution would have to explain. We make no attempt to provide such a theory since modeling this complicated set of forces is well beyond the scope of this paper. A theory would have to address at least the following four cross-national differences:

- differences in labor markets that affect earnings of individual household members;
- difference sources of capital and in returns to capital;
- demographic differences, such as the aging of the population and growth of single parent households, which affect both family needs and labor market decisions;
- differences across countries in tax and transfer policies that not only affect family income directly, but also may affect work and investment decisions.

Aggregating earnings across all individuals in a household and adding other sources of income takes us from the distribution of individual earnings to the distribution of family income. Ideally one would like to know how much of the change in inequality of total family income is caused by exogenous changes in each source of income. This would require a fully articulated model of behavioral responses. For example, if exogenous increases in inequality of male earnings led wives of low income husbands to work more, then this portion of the change in overall inequality would be caused by changes in the distribution of husbands' earnings, not wives' earnings. Structural models that include all behavioral links are well beyond the scope of existing empirical work. Researchers have, therefore, limited themselves largely to accounting exercises which decompose changes in overall inequality into a set of components.[3]

The inclusion of multiple income sources received by multiple individuals thwarts attempts to identify the causal links that led to variations across time and across countries in the distribution of total post tax and transfer household income. There is ample evidence that family

members take account of all sources of income available to the household in deciding not only how much each member might work, but also how to structure living arrangements. Moreover, governments themselves react differently to market income changes via changes in redistribution (tax and transfer) policy, and via other policies (e.g., government employment).

Our focus is on a limited set of countries, particularly OECD and other advanced industrial countries. Both the level and trend in inequality in these industrialized countries may be quite different from those in the developing world- discussed in chapter 13 and in the economies making the transition from planned to market systems discussed in chapter 14.

This chapter is in four parts. The first section explores key measurement issues which the empirical literature must address. The next section presents evidence on cross-national differences in the level of inequality of household income across countries in the late 1980s and early 1990s. The focus then shifts to trends in inequality of household income. This is followed by a comparison of mobility across countries and time. The chapter closes with a summary of the results presented in the earlier sections.

2. Conceptual and Measurement Issues

Cross-national comparisons of income must confront two major issues. The first is conceptual. What measure would one ideally use to compare distributions of well-being across countries? The second issue moves from the ideal to the possible. What is the impact of using imperfect data to approximate this ideal? While both of these questions would have to be addressed even in a study of a single country, they take on a somewhat different role in cross-national studies.

Ideal Measure

Ideally one would want to compare the difference in the distribution of lifetime utilities of persons in different countries. Utility comparisons would reflect differences in leisure as well as all forms of potential consumption, including home production and publicly provided goods. Consumption would be appropriately adjusted for family size to reflect economies of scale in consumption. Utility comparisons would take account of differences in constraints faced both by people living in the same country and differences in constraints faced by people in different countries. For example, differences in the ability to smooth income across periods or differences in the allocation of income and leisure within the family would affect the distribution of lifetime utility both within and across countries.[4] At best, yearly post tax family income adjusted for family size is a proxy for this more fundamental concept.

Impact of Measurement Error

Measurement error arises both from differences between the ideal and the measurable and from reporting error in the measurable. For example, post tax family income as reported by respondents may differ from the respondents actual income because of reporting error. The problem of measurement error is endemic to all income distribution studies, whether they focus on a single country or many countries. The question we ask in this section is whether the bias introduced by this measurement error is aggravated in cross-national studies. We start by focusing on differences in inequality across countries at a single point in time. We then turn to the impact of measurement error on differences in trends in inequality.

Level of Inequality. To focus attention on the key elements consider the following simple errors component model for the j^{th} percentile in country *c*:

$$m_c^j = d_c + v^j + e_c^j \qquad \textbf{(2-2)}$$

$$\ln P_c^j = \ln \pi_c^j + m_c^j \qquad \textbf{(2.1)}$$

where: P_c^j is the measured percentile; π_c^j is the percentile for the ideal concept, m_c^j is measurement error, d_c is a country specific component that affects all deciles, v^j is a decile specific component common to all countries, and e_c^j is a decile and country specific component.

We start by considering the effects of measurement error on estimates of the $\ln(P_c^{90} / P_c^{10})$ in a single country, which we call the 90/10 or decile ratio for convenience. Since

$$\ln(P_c^{90} / P_c^{10}) = \ln(\pi_c^{90} / \ln \pi_c^{10}) + (v^{90} - v^{10}) + (e_c^{90} - e_c^{10}) , \qquad \textbf{(2-3)}$$

we see right away that measurement error that affects all deciles equally within the country cancel. For example, consumption of public goods unrelated to decile rank within the country will not bias the 90/10 ratio.

Now consider the effect of measurement error in a cross-national study. The object of interest is the difference in the 90/10 ratio between two countries ℓ and k:

$$\ln(P_\ell^{90} / P_\ell^{10}) - \ln(P_k^{90} / P_k^{10}) = \ln(\pi_\ell^{90} / \pi_\ell^{10}) - \ln(\pi_k^{90} / \pi_k^{10}) + (e_\ell^{90} - e_\ell^{10}) - (e_k^{90} - e_k^{10}) . \qquad \textbf{(2-4)}$$

This illustrates the obvious, but sometimes overlooked point that decile specific errors that are common across countries do not affect cross-national comparisons of percentile ratios in a given year. For example, underreporting by respondents at the top or bottom of the distribution will not bias cross-national comparisons to the extent that this underreporting is common across countries.

The remaining measurement error in equation (2-4) reflects differences across countries at the 90th and 10th percentiles. Thus, the key measurement of concern to cross national studies is measurement error that differs *both* across deciles *and* across countries. For example, estimates of differences in inequality between two countries will be biased inasmuch as income

underreporting is greater at the 10th than the 90th percentiles and this degree of differential underreporting differ across countries.

While this simple notation illustrates that certain types of measurement error do not lead to bias in cross-national studies, we do not want to leave the impression that measurement error is not potentially important. Measurement error may be reduced by taking differences across countries but the signal to noise ratio may be increased. This can clearly be seen by comparing the signal to noise ratio for estimates of country specific inequality measures, $(S/N)_c$, as given by the right-hand side of equation (2-3),

$$(S/N)_c = \ln(\pi_c^{90} / \ln \pi_c^{10}) / \{(v^{90} - v^{10}) + (e_c^{90} - e_c^{10})\} \qquad \textbf{(2-5a)}$$

with the signal to noise ratio for differences across countries in these ratios, as given by the right-hand side of equation (2-4):

$$(S/N)_j - (S/N)_k = \left\{\ln(\pi_j^{90} / \pi_j^{10}) - \ln(\pi_k^{90} / \pi_k^{10})\right\} / \left\{(e_j^{90} - e_j^{10}) - e_k^{90} - e_k^{10})\right\} . \qquad \textbf{(2-5b)}$$

Comparison of (2-5a) with (2-5b) shows that while taking differences across countries reduces noise (as shown in equation (2-4)) it may reduce the signal even more. Thus, differences in 90/10 ratios across countries, which eliminates decile specific errors that are common across countries (the *v*'s in equation (2-3)), reduces the noise but the remaining noise may be large relative to what we are trying to measure, namely the *difference* in 90/10 ratios. Our distinction between measurement error that does and does not affect cross-national comparisons is, therefore, not meant to minimize the importance of measurement error but to focus attention on the relevant source of error.

Trends. Much of the recent literature has focused on differences across countries in trends rather than levels of inequality. Analyzing the biasing source of measurement error for these comparisons requires that we enter time explicitly into equations (2-1) and (2-2).

$$\ln P_{ct}^{j} = \ln \pi_{ct}^{j} + m_{ct}^{j} \quad \textbf{(2-6)}$$

$$m_{ct}^{j} = d_c + v^{j} + e_{ct}^{j} \quad \textbf{(2-7)}$$

$$e_{ct}^{j} = g_{ct} + w_t^{j} + f_{ct}^{j} \quad \textbf{(2-8)}$$

where g_{ct} is a time specific component that affects all deciles in country *c*, w_t^{j} is a time specific component that has differential effects across deciles, and f_{ct}^{j} is a component that is time, decile, and component-specific.

The trend in the 90/10 in country *c* is given by

$$\ln (P_{ct}^{90} / P_{ct}^{10}) - \ln (P_{c,t+1}^{90} / P_{c,t+1}^{10}) = \ln (\pi_{ct}^{90} / \pi_{ct}^{10}) - \ln (\pi_{c,t+1}^{90} / \pi_{c,t+1}^{10}) + (e_{ct}^{90} - e_{ct}^{10}) - (e_{c,t+1}^{90} - e_{c,t+1}^{10}) \; . \quad \textbf{(2-9)}$$

Following the logic of the previous section, differences across countries in trends will depend on g_{ct} and f_{ct}^{j} but not on w_t^{j} since the latter is measurement error that differs across time and decile but not across countries. Again, taking cross-national differences reduces the absolute level of noise but has an ambiguous effect on the signal to noise ratio.

Summary. This section has shown that some but not all sources of measurement error affect cross-national comparisons of levels or trends in percentile ratios such as the decile ratio: The following generalizations emerge:

- Measurement error that is independent of decile rank affects neither level nor trend in inequality in a single country nor in cross-national comparisons of inequality.
- Measurement error that is common across countries does not affect cross-national comparisons of levels or trends in inequality; each country's decile ratio is biased but the difference in ratios is not.
- Cross-national comparisons of trends in decile ratios are not affected by measurement error that is either time invariant or time varying but common across countries.

Definitions and Measures

The preceding section has shown that it is important to distinguish between different forms of measurement error. In this section we review the choices we need to make concerning the definition of income; the unit of analyses, income sharing rules, and the period of analysis in light of this discussion of measurement error.

Income Definition. Many studies use a comprehensive definition of money income, which includes all forms of cash payment received by persons in the household or family. This measure of gross income includes the earnings of all family members, property income, social insurance, universal cash transfers, and public assistance. They also include "near-cash" income such as food stamps and rent rebates which are measured in currency terms. Many studies also examine the distribution of disposable income, which is equal to a gross income minus direct taxes and social contributions.[5]

The foci in the literature on the distribution of after tax disposable money income ignores two factors which directly affect family well-being and whose distribution may vary widely across countries. The first is the value of in-kind income. This includes both private goods and publicly provided goods. Among the most important private goods are imputed rent to owner-occupied housing, the value of home production, and employee fringe benefits, including paid time off. The latter are particularly important given large differences in benefits across countries. For example the number of vacation days provided by employers differs substantially between the United States and other OECD countries. Publicly provided goods include widely distributed goods such as medical care, education, transportation and police protection. Since there are likely to be large differences across countries both in the amount of in-kind income and the covariance between these sources of income and cash income, the omission of in-kind items is likely to affect

distributional measures in country *c* at time *t* in as much as their omission affects deciles differently.[6]

Smeeding et al. (1993), Whiteford and Kennedy (1994), and Gardiner et al. (1995), find that the exclusion of noncash income reduces measured inequality. Smeeding et al. (1993) and Whiteford and Kennedy (1994) find that the omission of noncash income in the form of medical care, and education transfers and imputed rent from owned housing effect the level of inequality but not the ranking of nations. Gardiner et al. (1995) find fewer consistent effects.[7]

The second factor is indirect taxation. Mixes of direct and indirect tax vary substantially across nations (Atkinson, Rainwater, and Smeeding 1995, Table 3.6). If the distribution of taxes varies by type then the choice of which tax to include may affect the ranking of countries in a single cross-section. If the size or incidence of these taxes change over time, the choice of which to include may also affect the trends in inequality in different countries.

Estimates of indirect taxes paid (or noncash benefits received) are normally based on imputations that require specific measures of consumption as well as income. Thus, surveys must measure both income and consumption. Moreover, these imputations depend on several assumptions upon which there is little or no agreement among economists. For example, consider the incidence of indirect taxes on rental housing, taxes on employers, and taxes on corporations. These taxes may fall on profits, on workers, or on consumers. Thus, stockholders (who earn profits) and expenditures on taxed items must also be identified by the survey in order to impute such taxes. Limited experimentation with simulations (e.g., Bell and Rosenberg 1993) indicates that including indirect taxes leads to higher levels of inequality but unchanged rankings of inequality for Germany, Sweden, and the United States.

Income Data Quality. Even if there were agreement on how to measure the value of in-kind benefits and indirect taxes, it would still be difficult to obtain comparable measures of income across countries since the types of survey data used to measure inequality are not uniform in nature, purpose or objective. For instance, consider Table 1 which shows some commonly used surveys for several OECD countries.[8] Some surveys are designed to collect income data; others are derived from income tax records; and still others come from special supplements to labor force surveys. Some datasets are based on income questions taken from expenditure surveys (as in the case of the United Kingdom); others are separate waves of longitudinal household panel data (e.g., Germany); and still others are taken, at least in large part, directly from government administrative data (e.g., Sweden, Finland, and Denmark). Many nations have several types of income data. For instance, United States data on income could come from income supplements to labor force surveys (such as the Current Population Surveys data used here), annual or subannual income surveys, Social Security records, household income panel data, or expenditure surveys. Since each type of survey is likely to have a somewhat different primary focus, these differences are likely to affect income reporting error.

It is well known that income is underreported in almost all surveys. If the under reporting is non-random, then both the degree of under reporting and the incidence across income groups will affect measures of inequality. One way of identifying the amount of under reporting is to compare aggregates in the micro data sets with those from National Income Accounts and other external data sources, which are presumed to be more accurate in the aggregate. Atkinson, Rainwater, and Smeeding (1995, Table 3.7) show that while wages and salaries are fairly accurately reported across countries, total income reported in the micro data sets vary widely across the small number of countries for which we have such comparisons.[9] Overall income

comparisons of seven nations indicate that income surveys account for 77 to 93 percent of the aggregate amounts reported by external sources with five nations at 90 percent or above. We should hasten to point out that different nations have each made their own assumptions and imputations to compare aggregated microdata income component totals with adjusted administrative data. There has been no comprehensive cross-national study which has made such comparisons on a wholly consistent basis across countries.

Comparisons with aggregate totals give some idea of the magnitude of underreporting, but they do not tell us whether underreporting affects distributional measures. The latter require that underreporting be correlated with income. If everyone underreports their income proportionately then the mean of the distribution of income is lower but most measures of relative within-country inequality would be unaffected.[10] The impact of underreporting in cross national comparisons further requires that the bias in inequality measures be different in different countries. If they are not then differences across countries in inequality measures again will be unaffected by under reporting.

Underreporting is high for government transfers, property income, and self-employment income in all nations. Since transfers are more likely to be received by persons in the lower tail of the distribution, this underreporting increases measured inequality. On the other hand underreporting of property income tends to lower the income of families at the top of the distribution, which reduces measured inequality. Since these two sources of income have opposite effects on inequality, it is difficult to judge whether inequality is under estimated or over estimated in a given country.[11] Identifying the bias caused by underreporting is even harder when comparing countries. Whether underreporting affects cross-national comparisons depends on the degree to which underreporting varies across countries. If the distribution of underreporting were

similar in all countries this would affect the level of inequality but not necessarily cross-national differences in inequality.

Unit of Analysis and Sharing Rules. Well-being is affected by the resources available to persons in an income sharing unit and the resulting economies of scale from joint consumption. The unit of analysis should, therefore, encompass all persons who share income or benefit from economies of scale. There are two obvious choices for the accounting unit: the household (which includes all persons in a common residence) and the family unit (which includes all persons in the residence related by blood or marriage.) Whether to use the household or the family as the accounting unit depends the degree to which nonfamily members share income and/or benefit from economies of scale. For example, if three college students share an apartment, they are unlikely to be sharing income, but they are likely to benefit from economies of scale by having a common kitchen, living room, heat source, and having to pay only a small marginal cost for each extra bedroom. The fact that college students benefit from economies of scale but are unlikely to share resources, illustrates the problem of choosing an appropriate accounting unit. If one uses the family as the unit then each person is a separate accounting unit, which ignores economies of scale. Using the household as the unit of analysis, however, implies that the three people share their incomes fully.

The decision of whether to use the family or the household as the unit of analysis is further complicated by differences in institutions across countries. For example, consider differences in the proportion of couples who are cohabiting (rather than being legally married) across OECD countries. Such couples are very likely to share income and benefit from economies of scale, so the household would be the more appropriate unit of analysis. But unless the data set identifies cohabiting couples, one is left with the choice of treating them as unrelated individuals who do

not share resources or treating all unrelated individuals, whether cohabiting couples or not, as sharing income.[12] Recently analysts have begun to challenge this assumption and to show the different outcomes which may occur if sharing within households (or families) is not equal (Jenkins 1994; Sutherland 1996).

Once one defines the unit that shares income and consumption and the sharing rule, it is necessary to adjust the unit's income for economies of scale. Equivalence scales have been developed to accomplish this adjustment by taking into account those household characteristics deemed to affect economies of scale and economies of scope as reflected by differences in household size and composition. Buhmann, Rainwater, Schmaus, and Smeeding (1988) first proposed a single parametric approximation to equivalence scales which encompassed a wide range of scales in use:

$$\text{Adjusted Income} = \text{Disposable Income} / \text{Size}^{E} \ . \qquad \textbf{(2-10)}$$

The equivalence elasticity, E, varies between 0 and 1; the larger is E, the smaller are the economies of scale assumed by the equivalence scale. Various studies make use of equivalence scales ranging from $E = 0$ (no adjustment or full economies of scale) to $E = 1$ (per capita income which implies zero economies of scale). Between these extremes, the range of values used in different studies is very large. These adjustments for household size can have a large effect on the level of measured inequality within and across nations.[13] However, using different equivalence scales preserves the general rank order of countries, albeit at different levels of inequality. Inequality rankings at a point in time are fairly robust to choice of equivalence scales (Atkinson, Rainwater, and Smeeding 1995, Tables 4.9 and 4.10; OECD 1997a, Annex 3) which illustrates our argument that factors which are not country-specific do not affect cross-national comparisons. Evidence for differences in trends within the United States indicates that choice of

equivalence scale may affect the level of measured inequality but not its trend (Karoly and Burtless 1995).

Period of Analysis. The time period over which income is measured also affects measures of inequality. Inequality tends to decrease as the accounting period is lengthened since transitory fluctuations increase inequality in the current period but average out over longer periods. A standard economic model of utility maximizing agents with access to capital markets and full information implies that the appropriate accounting period is a lifetime, and that yearly measures of income overstate the degree of inequality. This, however, assumes that people have perfect foresight and can smooth out transitory fluctuations by lending or borrowing. Lifetime income may indeed be the proper measure for high income families who can either rely on savings or have access to capital markets to smooth transitory fluctuations, even with imperfect foresight. However, for low income or young families who have small savings and little access to capital markets, the appropriate accounting period may be a pay period or a month rather than a year. Thus, the use of an annual accounting period in most data sets (with monthly and weekly income in the United Kingdom being the largest exception) is likely to be too short for families that can smooth consumption over multiple years and too long for families that are severely credit constrained. Again, using the available rather than the ideal accounting period may affect inequality measures in each country but if the measurement error is the same in all countries this will not affect cross-country comparisons.

Summary. This brief review of measurement issues is designed to alert the reader to the types of choices and biases that exist in income inequality measures. As should be clear, the data with which we work are noisy and many of the results one obtains are affected by differences across surveys and over time. Sensitivity tests, which provide information on the differences that

measurement choices produce, should also be conducted wherever possible. In some cases, our analyses suggest that results may not be affected greatly by many of the choices we have to make.[14] We proceed cautiously but believe that the weight of the evidence provides a fairly consistent picture of differences in levels and trends in inequality across a variety of countries.

3. Differences in Inequality across OECD Countries

In this section we provide several alternative measures of inequality in OECD countries for the late 1980s or early 1990s. The following section sheds light on differences in levels of inequality as shown by Lorenz curves, decile ratios, and Gini coefficients. We begin with a brief description of the data we use in much of this paper.

Data and Measurement Choices

Our primary source of micro data is from the Luxembourg Income Study (LIS). The LIS data sets have been used here to compare the distribution of disposable income in 25 nations over a 20-year period, though not all periods are available for all nations.[15] This data overcomes some, but by no means all, of the problems discussed earlier. The Luxembourg Income Study (LIS) was created specifically to improve consistency across countries. The LIS data is a collection of micro data sets obtained from the range of income and other surveys in various countries (e.g. see Table 1). The advantage of these data is that extensive effort has been made by country specialists to make information on income and household characteristics as comparable as possible across a large number of countries. A further advantage of LIS is that it offers the only publicly available microdata sets for Denmark, Sweden, The Netherlands, Israel, and Finland. Access to the micro-data makes it possible to produce estimates based on individual household records, and to test the sensitivity of conclusions to alternative choices of units, definition, and other concepts. For

example, it is possible to check the robustness of findings to a series of adjustment for household size by applying a set of equivalence scales.

While LIS overcomes some problems of comparability, several problems remain. As mentioned above, the underlying data were originally designed in different countries for a variety of purposes, and so they clearly depart from the ideal of a single survey instrument uniformly applied to all countries.[16] Attempts to make these data sets comparable has costs as well as benefits. For example, not every variable is available on every dataset so some of the details in the original samples are lost. Another major drawback is that data are available only for a limited number of years due to both limited availability of surveys and costs of annually updating each nation's data. While LIS offers the largest collection of micro-data sets across a wide variety of countries, its drawbacks are potentially important. Therefore, whenever possible, we compare our results with those of country studies. The fact that these two sources of information are generally in agreement increases our confidence in LIS.[17]

Our specific measure of income is household disposable income per equivalent adult, using an "intermediate" equivalence scale of the square root of household size.[18] This is a commonly used equivalence scale which increases at a decreasing rate with family size. Data are weighted by the number of persons in each family, so income is measured as (after tax and transfer) disposable personal income per adult equivalent. All of the nations have the same definition of disposable income with the exception of Austria where self-employment income is not counted in their survey. The samples generally exclude persons living in institutions such as pensions, hospitals, and nursing homes; the homeless; military living in barracks; and undocumented immigrants. Registered immigrants are included. Coverage in every country is 96 percent or more of the

remaining civilian noninstitutionalized populations (Atkinson, Rainwater, and Smeeding 1995, p. 17). No major population groups are omitted from any survey.[19]

Differences in the Level of Inequality

We start by examining differences in income inequality across countries in the late 1980s and early 1990s. We focus both on the relative differences (the "various" percentile points and particularly the gap between the 10th and 90th percentile) within a country and how this translates into real differences across countries at different points in the income distribution. For example, how much less does a family at the 20th percentile in Sweden receive compared to the median Swedish family and compared to a family at the 20th percentile in the United States?

Measuring and Deploying the Distribution of Relative Income. One of the key used in income distribution research is the choice of inequality measure and form of presentation. The literature employs Lorenz-based measures (e.g., Gini coefficients, Lorenz-dominance measures, Hasse diagrams) and other descriptive measures.[20] Due to differences in top and bottom coding of survey data by nations and surveys, selected measures of inequality may be sensitive to these limits. Some national datasets include negative incomes (e.g., losses for the self-employed) while others bottom code at zero or at some minimal positive level. Most top code income at some high figure to preserve confidentiality among high income recipients. The effects of top and bottom coding or truncation bias on the Gini coefficient are well known (see Fichtenbaum and Shahidi 1988; Atkinson, Rainwater, and Smeeding 1995) and these boundaries need be tested for robustness of results.[21]

Our initial comparison of income distributions is based on Lorenz curves rather than summary measures, such as the Gini coefficient.[22] These plots allow us to see whether pairs of countries can be ranked by the standard dominance criteria.[23] Figures 1a through 1d present plots

for Nordic countries, the BENELUX countries, other European countries, and the Commonwealth countries. We also include data for the United States on each graph in order to give a common point of comparison. Figure 1a clearly shows that incomes are more equally distributed in all Nordic countries than in the United States. While the mean income for households below the 20th percentile was only 5.9 percent of the United States mean, the comparable figures for the Nordic countries range from 9.4 to 11.0 percent of their country specific means. Because the Lorenz curves of Nordic countries cross, we cannot rank distributions within the region.

The BENELUX countries in Figure 1b likewise show substantial uniformity across countries with each having greater equality than the United States. Among the BENELUX countries, The Netherlands is the least equal but the differences in inequality among BENELUX countries are small compared to the differences between these countries and the United States. Figures 1c and 1d show data for other European countries and some members of the British Commonwealth. There is less uniformity among these countries but the United States is still more unequal than any of them. Figure 1c shows that Germany is more equal than Italy and France. Canada dominates Australia which dominates the United Kingdom. The United Kingdom and United States, however, cannot be ranked since their Lorenz curves cross.

Another way to summarize this information is found in Figure 2 where several additional countries are represented. Nations from the Pacific Rim (Japan, New Zealand, and Taiwan) have been added along with Southern Europe (Spain, Israel) and Central Europe (Switzerland), and Ireland.[24] While not all of the points of the percentile distribution are laid out, and while the data are presented as percentiles of the median income (not of the mean income as in Figures 1a to 1c), the obvious advantages of this presentation is its ability to summarize several nations in one

picture and two summary measures of income distribution, the 90/10 ratio and the Gini coefficient. The bar chart and the decile ratio also helps summarize the concept of "social distance" between persons at each end of the distribution of income. A person at the 90th percentile in the United States has almost six and a half times the income of a person at the 10th percentile, while the distance is three times or less in the Nordic and BENELUX countries.

Two additional features stand out in Figure 2. First, the United States continues to be very different at the bottom of the distribution. The second lowest P^{10} value found in Figure 2 is 45 (Australia) compared to 34 in the United States. At the other extreme, several nations P^{90} values are near that of the United States, e.g., the United Kingdom and Ireland.

The second notable feature is the similarity in rankings based on the Gini coefficients and decile ratios.[25] For the most part these rankings produce the same pattern of inequality with Nordic and Northern European nations having the least inequality, followed by Central Europe, Southern Europe, and the Commonwealth, with the United Kingdom and the United States having the highest overall levels of inequality. The Pacific Rim nations (including Australia and the United States), as well as Japan are all toward the upper end of the inequality spectrum. Taiwan, in contrast, has below average inequality.

These comparisons are similar to those made using LIS based on earlier time periods with few exceptions (Gottschalk and Smeeding 1997). While some of the remaining differences are likely due to use of different data sources (e.g., France, see Tables A-2 and A-3). The one notable change is that the most recent round of data finds Canada's unchanging inequality moving it closer to the middle of the range of countries.

Summary. The United States has the least equal distribution of family income among all countries covered in this study. The Nordic and BENELUX countries have the most equal

distributions with the Commonwealth countries coming closest to the degree of inequality in the United States. The largest differences between the United States and the rest of the nations are in the lower part of the distribution of disposable income. Studies that decompose these differences indicate that greater earnings inequality and the relatively small level of social expenditures in the United States account for much of the differences.[26] As a result, Canada which has a personal earnings distribution that is not very different from the Untied States in the lower tail, manages to have substantially higher post tax and transfer family incomes at the bottom of the distribution. Other nations with a high proportion of low wage workers (e.g., Australia) also tend to do better than the United States once other earners and the effect of direct taxes and income transfers are factored in.

Distribution of Absolute Income. Thus far we have examined differences across countries in relative incomes by focusing on Lorenz curves and Gini coefficients. We have compared the average income of households below the p^{th} percentile relative to each country's mean. This properly measures the degree of inequality but ignores differences in real or absolute incomes across countries. While Swedish households below the 20^{th} percentile may have incomes closer to the Swedish mean than the comparable low income household in the United States, this does not necessarily mean that the low income households enjoy a higher standard of living in Sweden than in the United States. The higher mean in the United States may more than offset the higher degree of inequality.

In order to compare absolute levels of income we present generalized Lorenz curves which show the mean income of households below the p^{th} percentile measured as a proportion of the United States mean. This, however, requires an index with which to translate incomes in all countries into a common currency. The commonly used indices are based on purchasing power

parity indices (PPP's), which were designed to compare GDP per capita across countries. These are a useful starting point but there are several issues raised in using these indices to compare income/needs ratios at different points in the distribution. One of the most difficult issue is exactly what index to use. As Förster (1998) has shown, the rankings of several countries depends on whether one uses PPP's for all goods, for private final consumption, or only for food and clothing.[27] The second issue is whether a single index is appropriate for all points in the distribution. Applying a single index assumes that cost-of-living differences across countries for the average household is the same as for households at all points in the distribution. Third, the PPP indices constructed to compare GDP per capita may not be appropriate to compare after tax and transfer family money income when there are large differences across countries in the tax financed public provision of goods, such as education and health. While publicly provided goods are included in GDP they are not included in the money income received by households used in income distribution studies. For example, even if we had the ideal price indices to compare money incomes, this would still not solve the problem that most of the countries we examine have publicly provided health insurance and other publicly provided goods. While the exclusion of these goods also affect relative measures of inequality, the problem is particularly serious when making absolute comparisons.[28,29]

An additional problem in trying to rank countries on the basis of absolute incomes at the p^{th} percentile is that these rankings will depend on the percentile point chosen unless one country dominates another (i.e., income is uniformly higher at all points in one distribution than in the other). This is a particularly important problem for the countries we study since the higher mean income but greater inequality in the United States seldom leads to unambiguous absolute rankings on the basis of dominance criteria.

With these issues in mind we proceed in two steps. We first provide a set of comparisons of generalized Lorenz curves, which allow visual comparisons at all points in the distribution. We then turn to a comparison with other studies and try to draw general conclusions based on the evidence currently at hand.

We use the PPP index created by Summers and Heston (1991), to transform the distributions in Figure 1 into a common currency under the strong assumption that the PPP conversions reflect differences in purchasing power that are either equal at all points in the distribution or, if they are not, that these differences across percentile points are the same in all countries.[30] Figure 3a through 3d display generalized Lorenz curves which show the mean of the cumulative distribution up to the p^{th} percentile measured as a proportion of the United States mean (rather than as a proportion of the country specific mean as was shown in Figures 1a through 1d). Since almost all countries have lower mean equivalent income than the United States, the plots for these countries cross the vertical axis below one. Countries with higher absolute mean equivalent incomes than the United States at the bottom of the distribution have generalized Lorenz curves that start above those for the United States and then cross. The point where the two functions cross shows the percentile where the mean equivalent incomes of the truncated distributions are the same in the two countries. To the left of the crossover point, households in the United States have lower incomes in spite of the higher overall mean in the United States. For example, the data for the United States and Sweden in Figure 3a shows that the mean equivalent income of household below the 52^{nd} percentile is the same in both countries.[31] The value for $\ln (P^{50}_{\text{Sweden}} / P^{50}_{\text{United States}})$ is equal to -0.19, indicating that the median family in Sweden has a level of spendable real equivalent income that is roughly 83 percent of the United States median. However, families lower in the lowest 25 percent of the distribution have higher

absolute equivalent incomes in Sweden. The cross over point for Finland is similar to that for Sweden and for Denmark is the crossover point at the 70th percentile.

Figures 3b and 3c show generalized Lorenz curves for the BENELUX (countries) and other European nations. In most cases the generalized Lorenz curves cut the curve for the United States somewhere below the median, indicating that the median person in the United States lives in a household with higher equivalent income than the median person in these countries, but persons in the lower tails of the distributions have higher absolute incomes than those in the United States in all countries other than France. For the BENELUX nations, the crossover points range between the 33rd and 63rd percentiles. (The Netherlands and Luxembourg respectively). France has lower income than the United States at all points and Germany has a crossover point at the 45th percentile.

The Commonwealth nations (Figure 3d) present a somewhat different picture. Australia cuts the United States distribution at the 31st percentile, while the United Kingdom lies everywhere below the United States. This means that real incomes are lower at all percentiles in the United Kingdom than in the United States. Surprisingly these PPP conversions indicate that Canadians enjoy a higher income needs than the United States at all points in the distribution (see also Wolfson and Murphy 1998.)

Summary. Our data indicate a substantial gap in the real money incomes of United States families in the bottom part of the income distribution compared to similarly situated families in the Nordic countries and in Luxembourg, Germany, and Canada. Low income families in the United States, however, have higher money incomes than comparable families in the United Kingdom and France. For the reminder of our countries the differences are too small to warrant even qualified statements.

Our results can be compared to several other studies that use different PPP's, different methods or different years.[32] For example, one early study (Atkinson, 1996) compares real income with the European Union. There is a general consensus across these studies that despite the lower mean income in the Nordic countries, incomes at the bottom of the distribution are higher, than in the United States.[33] Luxembourg and Canada, likewise, stand out as countries that dominate the United States at the bottom of the distribution. For other countries there is either insufficient consensus or an insufficient number of studies to warrant strong conclusions.

4. Differences in Trends in Inequality

Do the differences in inequality in OECD countries in the late 1980s and mid-1990s reflect convergence to a common level of inequality or are the less equal countries (the United States, the United Kingdom, and Australia) becoming even less equal? To answer these questions we start by comparing shorter term trends in inequality (from 1979 onwards). We then shift to longer term trends in inequality (from the 1950s through the 1970s) for a smaller number of nations.

Trend in Income Inequality: 1980 to 1995

Because the LIS data cover only two to four data points in each nation, we rely on published data from other sources to assess the trend in income inequality. While differences in units, income measures equivalence adjustments and other factors in different studies make it difficult to compare levels of inequality across studies, the trends will be comparable as long as differences across studies do not change over time.

The recent empirical evidence concerning trends in income inequality in different nations is summarized in Figure 4. Countries are listed in order of yearly percentage changes in disposable

income inequality (as measured by the change in the Gini coefficient) from largest to smallest change. Also shown is the absolute yearly change in the Gini over this same period.[34]

Inequality increased by more than 2 percent per year in one nation (the United Kingdom); and by 1 percent per year in four nations over this period (Sweden, Denmark, The Netherlands, and Australia); and from between 0.5 to 1.0 percent per year over this period in seven countries (Japan, Taiwan, the United States, Switzerland, France, Germany, and Norway). In four other nations (Israel, Canada, Finland, and Ireland) the change was approximately zero, while in Italy inequality declined modestly.

The largest percentage changes in income distribution took place in two different countries, one that experienced large increases in earnings inequality, United Kingdom, and one that did not, Sweden. Among the next three nations, two had small increases in inequality of labor market income (Denmark, and The Netherlands), and the other (Australia), larger than average changes in earnings inequality. While household income inequality increased in several countries, the timing of changes were also markedly different. In the United Kingdom income inequality fell through the mid-1970s but the Gini coefficient rose by more than 30 percent between 1978 and 1991, and has remained roughly constant since. This is more than double the decline in the United Kingdom from 1949 to 1976.[35] In Sweden all of the increases came since 1989; in Denmark they occurred during the late 1980s, and in The Netherlands from the mid-1980s to the mid-1990s. While the large relative change in Gini in the United Kingdom might be ascribed to the fact that it started from below average base year Gini, the absolute increase in inequality is also larger in the United Kingdom than in any other nation. The Swedish, Danish, and Dutch distributions had relatively high percentage changes in their Ginis in part because they began from a lower base Gini. But Sweden also experienced a large absolute change, second only

to that found in the United Kingdom. Still, the Dutch, Danish, and Swedish income distributions have remained considerably more equal than either Australia or the United Kingdom (see Figure 2), while Denmark, Australia, and The Netherlands display a much smaller absolute change in their Ginis than did Sweden and the United Kingdom.

The United States, Japan, Taiwan, France, Germany, Switzerland, and Norway form another group of countries with moderate increases in family income inequality. Patterns of change in inequality differ across these nations as well. In the United States, the largest increases in inequality occurred in the early 1980s and 1990s, peaking in 1994. In Japan and Taiwan, the largest changes were during the late 1980s, while in France, Germany, and Norway, inequality did not increase until the early- to mid-1990s. What is remarkable about the other five countries is that they have, so far, experienced little or no increases in the dispersion of family income. In Italy, measured income inequality has declined slightly since 1979, falling sharply between 1979 and 1991 and then rapidly increasing (see also Figure 5c).

There also appears to be no clear relation between the trend over the 1980s and the overall level of inequality at the start of the period. Inequality increased both in the United States and Australia, with a high level of inequality even before the increase, and in Sweden, Denmark, and The Netherlands, which started from much lower levels of inequality in the 1980s. Inequality fell by 4 percent in Italy but rose by 8 percent in France and Germany and by a third in the United Kingdom, all four occupying intermediate positions in the mid-1980s.[36] Nor is there a consistent country group story. Among the Nordic countries, Sweden (28 percent) and Denmark (11 percent) experienced a rapid rise in inequality in the early 1990s, and Norway (8 percent) a more modest rise, while Finland (-1 percent) did not. In Europe we find large secular increases in inequality in the United Kingdom, Denmark, and The Netherlands but smaller increases in

Germany, Switzerland, and France, no increase in Ireland and a slight decline in Italy. Canada experienced no measurable increases in inequality of family income while the United States and Australia experienced much larger increases, despite similar changes in earnings inequality.[37] Only in Japan and Taiwan do we find similar changes in similarly situated nations over roughly the same period.

Whether the other countries will follow the trends in these nations is an open question. There is increased pressure from high unemployment and rising earnings inequality in most of the nations shown here (OECD 1996), and very recent signs that they are having predictable effects in some nations (e.g., The Netherlands, Germany, and France). Employment policy, tax and transfer policy, and other factors (e.g., increased labor force participation by married women) have so far prevented these market influences from showing up in the distribution of disposable income in some nations. Yet the pressures are building. At each stage of similar comparisons (e.g., Atkinson, Rainwater, and Smeeding 1995 for the early to late 1980s; Gottschalk and Smeeding 1997 for the early 1980s through early 1990s) and now through the mid-1990s, an increasingly greater number of countries are exhibiting secular increases in inequality.[38] At the same time the nations which in the first comparison exhibited the largest rise in inequality (e.g., the United States and the United Kingdom) appear to be experiencing a plateau in those increases (see Table 6).

Longer Term Trends

Few nations have continuous annual data series which go back before the 1960s, and most that do have such series, have changed survey designs, income measures or other factors since that time.[39] Here we present evidence for the United States (1959 to 1995), the United Kingdom (1970 to 1995), Norway (1970-1995), Italy (1978-1995), Ireland (1971-1995), The Netherlands (1967-1994), Taiwan (1964-1995), France (1970 to 1994), Japan (1962 to 1993), Sweden (1967

to 1994), and Finland (1966 to 1994), Taiwan (1964 to 1995) (see Figures 5a, 5b, 5c, and 5d). We also present data even longer trends for the United States (1947 to 1995) and the United Kingdom (1949 to 1991) (Figure 6).[40]

The historical literature on income distribution in the United States and the United Kingdom, suggests that income and wage inequality were both much more unequal in the early part of the century than in the 1960s or 1970s.[41] Atkinson (1997a) has suggested that rather than continuous trends in income inequality, history is rife with various "episodes" of greater or lesser growth in inequality in many nations.[42] The 1960s and 1970s could be the aberration of low inequality with the 1980s and 1990s being more typical. Certainly the gains from the post-World War II economic recovery and boom during the 1950s and 1960s in the United States were more widely shared by the lowest income groups than were later changes. A similar pattern emerges for the United Kingdom (Joseph Rowntree Foundation 1995). Was their also such a pattern in other nations?

Figures 6a, 6b, 6c, and 6d provide some evidence of a U-shaped pattern in almost all other countries for which we have data. Each figure plots Gini coefficients for a set of countries, (with the Ginis benchmarked to 1.00 in 1979), and uses the same scaling on the vertical axes. The United Kingdom, Sweden, The Netherlands, and Taiwan show very clear U-shaped profiles with the troughs coming in the late 1970s or early 1980s (Figure 6a) and also for Norway and Italy, with troughs in the 1980s (Figure 6c). Flatter U-shaped patterns are also apparent for the United States, France, and Japan (Figure 6b) and for Ireland (Figure 6c). Where the United States stands out is the timing of the change in inequality. While almost all other countries experienced a decline during the 1970s and a rise in the 1980s, the United States reversal is a full decade earlier and quite continuous. The U-shape is just barely visible for Ireland (Figure 5c), but seems clear

for other nations in Figures 5a through 5c. The lack of a U-shaped profile for Germany may be a result of our not having data prior to 1972 since it shows little change in inequality during the 1970s but a sharp increase since the mid-1980s (Figure 6d). Finland is the only country to show a decline that is not followed by an upsurge in inequality during the 1980s and 1990s (Figure 6d), though inequality in Finland has risen slightly since 1987.

The two nations with the longest pattern of comparable data on inequality come are the United States (1947 through 1996) and the United Kingdom (1949 through 1994).[43] Both series shown in Figure 6 bear a remarkable resemblance with inequality in the United Kingdom in 1985 at the same level as 1949 and rising significantly since then before flattening out in the mid-1990s (see Figure 6a). In the United States, by the early 1980s inequality had reached 1948 levels and increased markedly before flattening out in 1994-96. The figures in these two nations strongly suggested that the 1950s and 1960s in the United States and the late 1970s in the United Kingdom were periods of unmatched equality in the income size distribution.[44] The question which remains for others to answer is what were the economic demographic, institutional and policy forces which produced this pattern in each nation?[45]

5. Mobility

Thus far we have focused on comparisons of yearly income distributions across time and across countries. These may, however, be misleading since persons who have low income in one year may move up the distribution in the following year. This suggests that if persons are able to smooth income across years then a longer accounting period may be more appropriate.

The relationship between inequality of yearly income and inequality of income averaged over multiple periods depends on the full covariance structure of incomes. The relationship can be seen most easily by considering the variance of the log of average income. Let, $f(Y_1, Y_2, \ldots, Y_K)$ be the joint distribution of log income across *K* periods. The variance of the average *Y* is given by:

$$var(\bar{Y}) = \left[\frac{1}{K^2} \sum_{t=1}^{K} var(Y_t) + \sum_{t=ls \neq t}^{K} \sum cov(Y_t Y_s) \right] \qquad \textbf{(5-1)}$$

$$= \frac{\overline{var}}{K} + \frac{K-1}{K} \overline{cov} \ .$$

where $\overline{var} = \frac{1}{K} \sum^{k} var(Y_t)$

and $\overline{cov} = \frac{1}{K^2 - K} \sum \sum cov(Y_s Y_t)$

The variance of multiple-period income $(var\, \bar{Y})$ is, therefore, a function of the average variance $(\overline{var})$ and the average of the covariances $(\overline{cov})$.[46] It can be shown that since correlations must lie between -1 and 1, the variance of multiple-period income can never be larger than the average variance of single-period income.

Equation (5-1) makes it clear that inequality of multiple year income depends on covariances as well as variances. Differences in mobility across countries may, therefore, affect comparisons of inequality based on multiple year income. Equation (5-1), however, also makes it clear that if mobility is to offset the impact of **increases** in inequality there must be a **change** in covariances. Increases in yearly inequality, as captured by increases in $(\overline{var})$, must be offset by sufficiently large decreases in $(\overline{cov})$ in order to keep $(var\, \bar{Y})$ from increasing. The extent of mobility, as captured by the level of $(\overline{cov})$, is irrelevant to changes in inequality.

We first turn to a brief review of the evidence on cross-country differences in the amount of family income mobility. Later we present the very limited evidence on changes in mobility.

While the United States has substantially more inequality than other OECD countries, it is not an outlier when it comes to mobility. Aaberge et al. (1996) compare income mobility in the United States, Denmark, Norway, and Sweden. In spite of very different labor market and social institutions these countries have remarkably similar income mobility. As a result, the ranking of countries remains unchanged when the accounting period is extended from 1 to 11 years. Burkhauser, Holtz-Eakin, and Rhody (1997) likewise find income mobility in the United States and Germany to be very similar. Evidence on earnings mobility reviewed in OECD (1996) indicates that the United States had the third lowest earnings correlation coefficient among eight countries (Denmark, Finland, France, Germany, Italy, Sweden, the United Kingdom, and the United States) and was in the middle of the pack when countries are ranked by the proportion of persons staying in the same earnings quintile. Denmark and Finland have the most earnings mobility while Italy and Germany have the least.[47] Using the percentage reduction in inequality as a measure of mobility OECD (1997, Table 2.2) places the United States again in the middle of the pack of six OECD countries.

In summary, the United States is not an outlier in either earnings or family income mobility. In spite of very different social and labor market institutions the United States has mobility patterns very similar to countries as diverse as the United Kingdom, Italy, and Sweden. With similar mobility patterns the rankings of countries on measures o inequality are not very much affected by the length of the accounting period.

These cross-sectional comparisons are not germane to the question of trends in inequality. It is only if mobility **increased** that the **trend** in inequality could be offset by mobility. But obtaining trends in mobility requires very long panels. Since mobility itself requires income information for more than one year, changes in mobility require even longer periods. Therefore,

the information on trends in mobility is very limited. Danziger and Gottschalk (1998), using over 20 years of data from the Panel Study of Income Dynamics, explore whether family income mobility changed in the United States. They examine both changes in short-term mobility (changes in the probability of being in the same quintile in *t* and *t*+1) and long-term mobility (changes in the probability of being in the same quintile in *t* and *t*+10). None of their measures show an increase in family income mobility. Likewise Gottschalk and Moffitt (1995) find no evidence of increases in earnings mobility in the United States. These studies, therefore, indicate that the rise in yearly inequality was not being offset by changes in mobility.

6. Summary and Research Implications

Our purpose was to summarize the empirical evidence on income inequality in OECD nations. Concerns about growing inequality in incomes (and also earnings and wealth inequality) have fueled social and political debates in many OECD countries. Over the past 15 years new data resources such as LIS, and the increased willingness of national statistical offices to furnish public use data has provided the raw material to begin to answer some of the factual questions. And new international organizations and teams are now beginning to work improve comparability and to set practical guidelines for improved cross-national comparability.[48]

While the data are by no means perfect, they produce some consistent patterns and provide answers to most of the questions posed at the beginning of this chapter. The range of income inequality in OECD countries is very wide at any point in time. The decile ratios in the most unequal country (United States) is more than twice as large as that found in the most equal country (Finland) and the Gini coefficient more than half again as large.

Cross-national comparisons can be made in real as well as in relative terms. On a purely relative basis, lower income groups appear to be further from the median of the distribution in the United States than in other nations.

While it is more difficult to make absolute comparisons, our data indicate that Americans at the bottom of the distribution have lower absolute as well as lower relative incomes. The higher mean does not offset the higher level of inequality, nor does income mobility in the United States offset its higher level of inequality.

Income inequality has increased dramatically in a number of countries, particularly in the United Kingdom but also in The Netherlands, Denmark, Sweden, Australia, and seven other nations. While income inequality rose in 12 of the 17 nations examined from 1979 to 1995, this trend was not universal. In almost all countries inequality declined through the 1970s and started increasing in the mid 1980s through the mid 1990s. Thus, the increases we are seeing today are offsetting gains made during the 1960s and 1970s. Explanations of these trends and their periodicity are high on the research agenda.

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Endnotes

1. The unit of analysis for income sharing is the household (all persons sharing common living arrangements) though we sometimes interchangeably use the term family as well.
2. Gottschalk and Smeeding (1997) indicate that changes in the distribution of household incomes mirrored changes in the distribution of earnings in some, but not all, countries.
3. For example see Bourguignon and Martinez (1996).
4. Utility will be lower for persons in families not able to smooth consumption, either because they live in countries with limited access to capital markets or because of unequal access to capital markets within a country. Similarly differences in the allocation of resources within families will affect the distribution of lifetime utility across persons. And these may differ across countries. Finally, concepts different from utility might be appropriate for measuring well-being, e.g. Sen's (1992) concept of capabilities might be used instead of utility..
5. These measures follow closely the guidelines set out by the United Nations (1977) and other bodies. See Atkinson, Rainwater, and Smeeding (1995), chapter 3, pp. 30-35 and Australian Bureau of Statistics (1997) for a discussion of remaining differences.
6. The omission of in-kind income will lower the mean and will likely affect distributional measures.
7. The study by Gardiner et al. (1995), experiments with different types of income definitions, poverty definitions, and different schemes for valuation of noncash benefits for two countries, the United Kingdom and France. They find that depending on what is included and on how it is valued, the poverty rate rankings of these two nations can be reversed by a particular set of income and poverty definitions.

8. Table 1 is taken from Smeeding and Weinberg (1998). Most of these datasets are included in the Luxembourg Income Study (LIS) database which is described below.

9. See Atkinson, Rainwater, Smeeding (1995). A group of these nations, the so-called Canberra Group, have joined to begin to set guidelines and standards for income distributional studies and to improve reporting of data quality comparisons and hopefully data quality itself. For more on this see Australian Bureau of Statistics (1997).

10. Note, however, that if the ratio of mean incomes to total national income differ across countries, purchasing power parity based comparisons of mean income will differ from comparisons of total national income.

11. The self-employed are found at both ends of the distribution, again producing uncertain findings.

12. In the Luxembourg Income Study (LIS) data sets we use, cohabiting couples are treated as two families living in a single household in some nations. The data for Sweden, Norway, and The Netherlands classifies unmarried couples living together of whatever gender as married. See footnote 15 below for a more complete description of LIS.

13. See Coulter, Cowell, and Jenkins (1992) and Buhmann et al. (1988). An important and nonobvious lesson from these papers is that the relationship between inequality measures and elasticities is nonmonotonic. Recently the literature and equivalences adjustments in practice have moved beyond the one parameter equivalence scale to two parameter scales which include adjustments for types of individuals (e.g., by age) as well as for family size. See Jenkins and Cowell (1994) on this issue.

14. Further information on these topics may be found in Atkinson, Rainwater, and Smeeding (1995), Gottschalk and Smeeding (1997), Burniaux et al. (1998), and in the technical

material provided by many National Statistical Offices.

15. For additional information please email <LISAA@maxwell.syr.edu> or <caroline@post.ceps.lu> or visit the LIS homepage at Http://www-cpr.maxwell.syr.edu/lis-part//. The LIS website is also the website for the Canberra Group on household income statistics.

16. Even when a single survey, e.g., the European Community Household Panel, is carried out in multiple countries, robustness and comparability remain key issues (Verma 1998).

17. For example, of country studies of earnings inequality, see Freeman and Katz (1993). For income inequality see Gottschalk, Gustaffson and Palmer (1996). For additional comparisons, see Gottschalk and Smeeding (1997), Atkinson, Rainwater, and Smeeding (1995), and OECD (1997).

18. Adjusted income is equal to disposable income/(family size)$^{.5}$.

19. This includes Japan where their Survey of Income Redistribution includes all but the institutionalized population as opposed to their Income and Expenditure Survey which until 1995 omitted single person units (Fukui 1996).

20. See Cowell (Chapter 2) and Jenkins (1991) for compact and useful surveys of summary measures of inequality.

21. For instance, Smeeding and Gottschalk (Forthcoming, Table 1), show that while most OECD nations Gini estimates vary little with a top code of ten times the median versus the amount reported on the survey, the Gini for Russia changes from 0.437 to 0.393 when a top code of ten times the median in imposed. However differences may still remain. For instance, Ryscavage (1995), addresses the effects of changing top-coding of income in the United States Current Population Survey (CPS) on measures of inequality. In the CPS both individual earnings and overall household income have been subject to different

topcoding over time. These changes may have some effect on the trend in overall income inequality. Fortunately the LIS topcode of ten times the adjusted median lies below the CPS topcode for 1994 and hence does not affect the estimates in Figure 2. Moreover, this topcoding does not effect the P_{90} measure which produces a similar result in terms of crossnational rankings of the level of inequality.

22. Data for these plots are presented in Appendix A to facilitate any comparison the reader may wish to make.

23. See Chapter 2 in this volume for properties of the Lorenz curves and dominance criteria. As is well known, the vertical axis in these plots can be labeled either as the share of income received by the p^{th} percentile or the mean of the truncated distribution, measured as a percent of the mean of the untruncated distribution.

24. With the exception of New Zealand and Japan, all of the data in Figure 2 came from LIS. We thank Takahiro Fukui of the Japanese Statistics Bureau and the New Zealand Central Statistical Office for their help in preparing these estimates.

25. The correlation between the percentile ratios and the Gini coefficient is 0.913

26. See Gottschalk and Smeeding (1997) for evidence on the distribution of earnings. See Smeeding (1997) on low earnings, social expenditures, and income inequality.

27. Differences may also depend on the set of PPP's selected and their vintage. For instance, the Penn World Tables PPP's used here may differ from the World Bank PPP's and from the PPP's in the European Comparison Project (ECP) data provided by the OECD. Furthermore, OECD PPP's are revised approximately every five years. Using different vintage of PPP's, e.g., 1989 estimates based on 1990 PPP's compared to the 1995 PPP's also produces somewhat different results.

28. If the distribution of publicly provided goods was the same as the distribution of market goods then their exclusion would not affect the ranking of countries when using relative measures. They would, however, affect absolute differences across countries as long as countries differed in the amount of public provision.

29. Dowrick and Quiggin (1994) explore the role of differences in relative prices and tasks across countries and conclude that rankings of mean incomes of countries with GDP per capita that are less than 10 percent apart can be easily reversed.

30. We use the Penn World Tables Mark 5.6 for our PPP's (Summers and Heston 1991), which translates average incomes into a common currency. Figures 3a to 3d are calculated by using the ratio of the United States consumer price index in the given year to United States 1991 CPI and multiplying this factor by the PPP given by the Penn World Tables for 1991. This factor then produces a multiplier which is used to modify all percentile point (P) of the national distributions. This is the method suggested by Summers and Heston (1991) and others for use with aggregate data. A slightly different method was used in Gottschalk and Smeeding (1997) with largely similar results.

31. The points where the country specific plots cross the United States plot and the horizontal axis should be viewed as rough indicators, not precise points since the intersection points will depend on the specific years in LIS and other idiosyncratic differences in data discussed in the preceding footnotes. This caveat is particularly important when the two functions are flat. In this case small movements in either function will have a large effect on the crossover points. See Dowrick and Quiggin (1994).

32. See chapter 6; Blackburn (1994); Förster (1993); Atkinson (1997b); Gottschalk and Smeeding (1997); and Rainwater and Smeeding (1995).

33. The single exception is Blackburn (1994) who shows poverty rates based on the United States poverty line converted to Swedish kronor using PWT PPP's is twice as high in Sweden than in the United States in the mid-1980s

34. Percentage change may be misleading in cases such as Sweden or Denmark, where the base Gini is much lower than in other nations. Because we have data for different periods in different nations, we standardize by dividing by the number of years over which we measure change. The raw data which underlies these changes and our sources for these data are presented in Appendix Table A-2. In a few cases, notably France, Norway, and Ireland, we interpolated the estimates from different time series. These are shown in Table A-3. For many nations we have compiled three or four sets of estimates for the trend in inequality. However, because these estimates show largely the same trends, we use only the one set with the most recent estimates. The trends we find are very similar to those in OECD (1997a).

35. Compare Karoly (1995) to Atkinson (1997a). See also Appendix Table A-2 and Figure 6.

36. Changes come from the bottom row of Appendix Table A-2.

37. See also Card and Freeman (1993) on United States and Canadian comparisons.

38. Burniaux et al. (1998, Table 2.2) reaches a similar conclusion. They find that beginning in the mid-1980s only Canada has not experienced at least a 2 percent increase in inequality.

39. For a longer look at pieced together time series or older time series of estimates see Chapters 3 and 4, and Plotnick, Smolensky, Evenhouse and Reilly (1998).

40. We have pulled together various series of inequality measures from national studies and from the Burniaux et al. (1998). These studies are based on one or more time series of data, interpolated at overlaps in some cases. See Appendix Tables A-2 and A-3 for

additional detail.

41. This literature includes Williamson and Lindert (1980), Plotnick, Smolensky, Evenhouse, and Reilly (1998), and Goldin and Margo (1991), among others in the United States and Lydall and Lansing (1959) and the Joseph Rowntree Foundation (1995) for the United Kingdom and the United States.

42. When two or more episodes occur over the time period used to measure inequality, simply dividing by the number of years as in Figure 4 may obscure both the magnitude and differences in trends. Hence, we present some of the trends not "smoothed" by this and technique in Figure 6, and suggest that the numerical estimates in Figure 4 be compared to the pictorial trends in Figure 6.

43. Data for each of these nations are from the U.S. Census Bureau (Weinberg 1996; U.S. Bureau of the Census 1997) and from the Joseph Rowntree Foundation Inquiry into Income and Wealth (Joseph Rowntree Foundation 1995; Förster 1998). Some Nordic countries may have even longer trends available, but were unobtainable by the authors or see for instance, Gustafsson and Johansson (1998) and Eriksson and Jäntti (1998).

44. They also suggest that inequality has risen to new postwar heights in both of these nations. Only Japan also finds its current level of inequality at a post-war high. Sweden's rise in the 1990s still leaves it below the 1967 peak, as does Taiwan's rise compared to its 1967 peak (see Figure 5a).

45. For recent attempts at answering this question, see Burniaux et al. (1998) and Gustafsson and Johansson (1997).

46. This term is an average covariance because the K by K covariance matrix has K^2 elements, K of which are variances.

47. Burkhauser, Holtz-Eakin, and Rhody (1997) likewise find that the United States has greater earnings mobility than Germany but similar family income mobility.

48. These include the Canberra group (Household Income Steering Group) offices and international bodies working to improve data quality and comparability (Australian Bureau of Statistics 1997).

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Table 1. Type of Survey Data and Conceptual Data Quality

1. Income or Living Standard Survey[a]	United States (unofficial), The Netherlands, Australia, Canada, Taiwan, Ireland, Italy, Switzerland, Japan
2. Combination of survey and administrative records[b]	Finland, Sweden, Denmark
3. Income Tax Records[c]	France, Norway
4. Panel Study[d]	Belgium, Germany, Luxembourg
5. Labor Force Survey Supplement[e]	United States (official), Austria
6. Expenditure Survey[f]	United Kingdom, Spain

[a]Survey primarily aimed at measuring living standards or income. Secondary aims may include other items such as wealth, labor force status, expenditure, earnings, home ownership, finances, etc.

[b]Survey asks respondents for permission to access confidential comprehensive government registries and administrative data to get some income information. In Finland, additional information is obtained from interviews.

[c]Survey basis is from income tax records. Additional imputations are made for nontaxed income sources and related issues. Frame also used expenditure survey data.

[d]Dataset follows same persons over multiple years; cross-section data is taken as a "slice" of data for these persons for a given year.

[e]Primary survey objective is labor force participation, employment, unemployment, etc.; special supplement provides income data.

[f]Primary purpose of survey is expenditure data, but monthly/weekly income information is also gathered in some great detail.

Source: Atkinson, Rainwater, Smeeding (1995, Table 3.3), updated and expanded.

Figure 1a
Lorenz Curves for the Nordic Countries and the United States

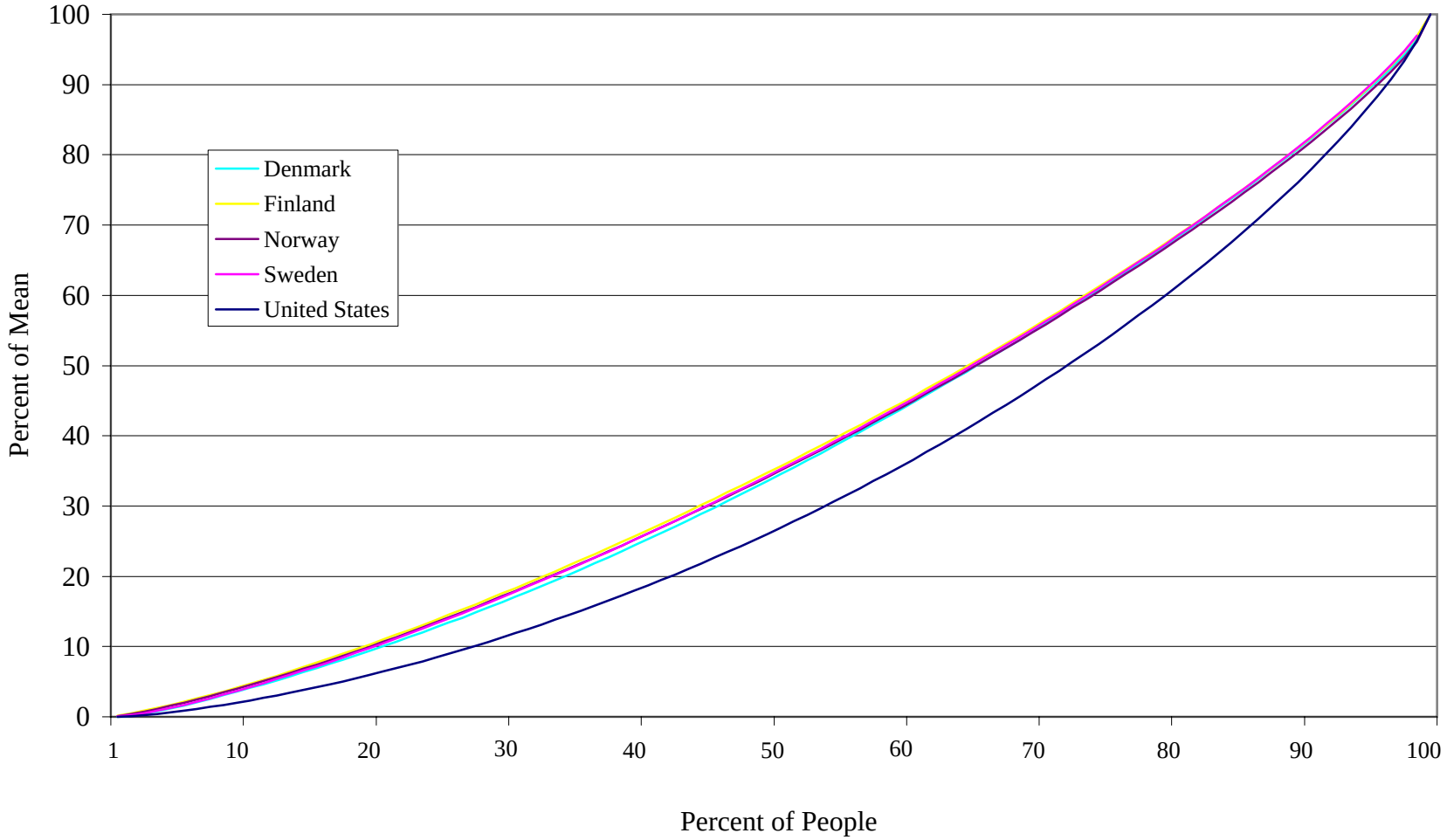


Figure 1b
Lorenz Curves for the BENELUX Countries and the United States

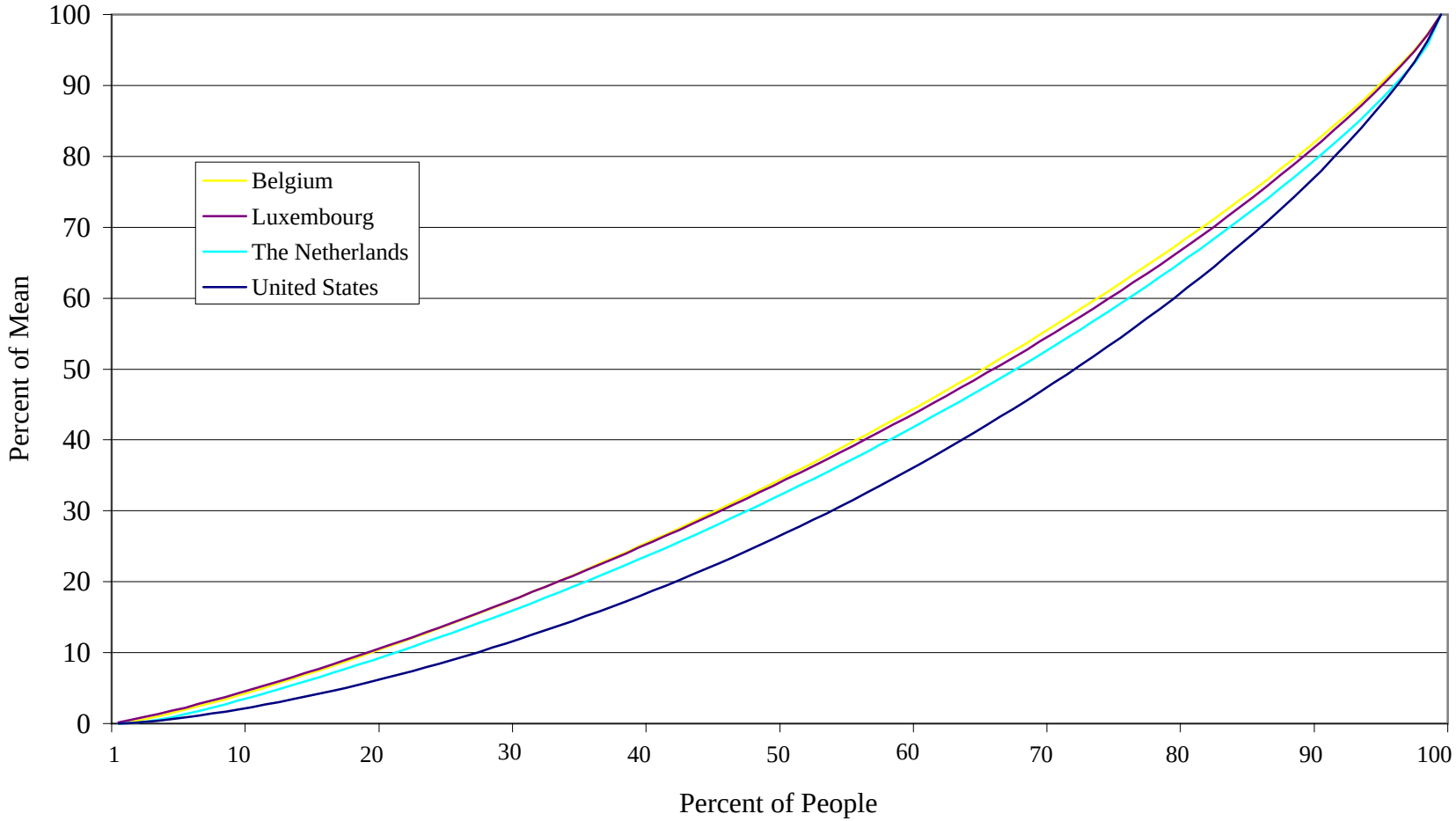


Figure 1c
Lorenz Curves for the Other European Countries and the United States

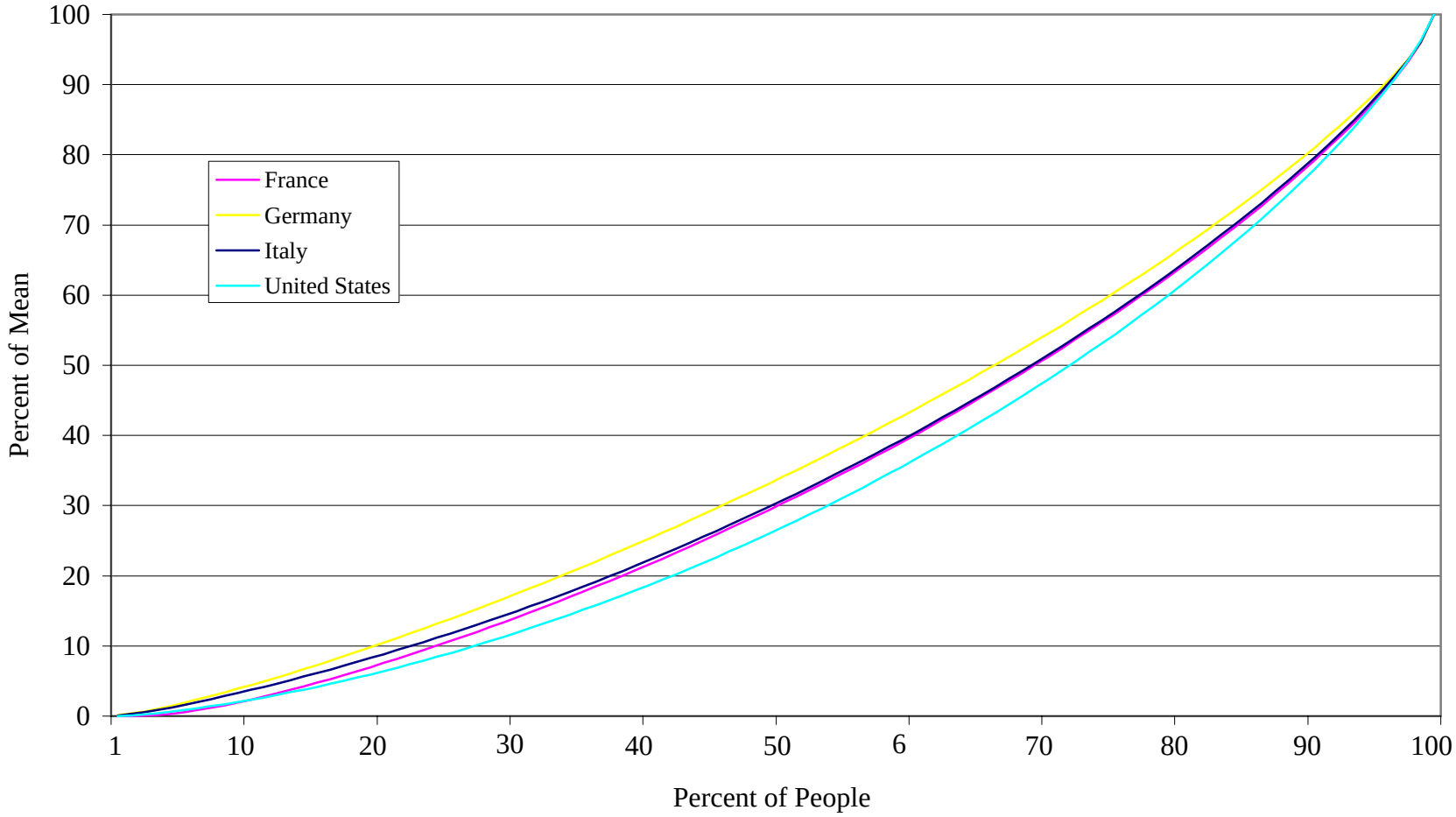


Figure 1d
Lorenz Curves for the Commonwealth Countries and the United States

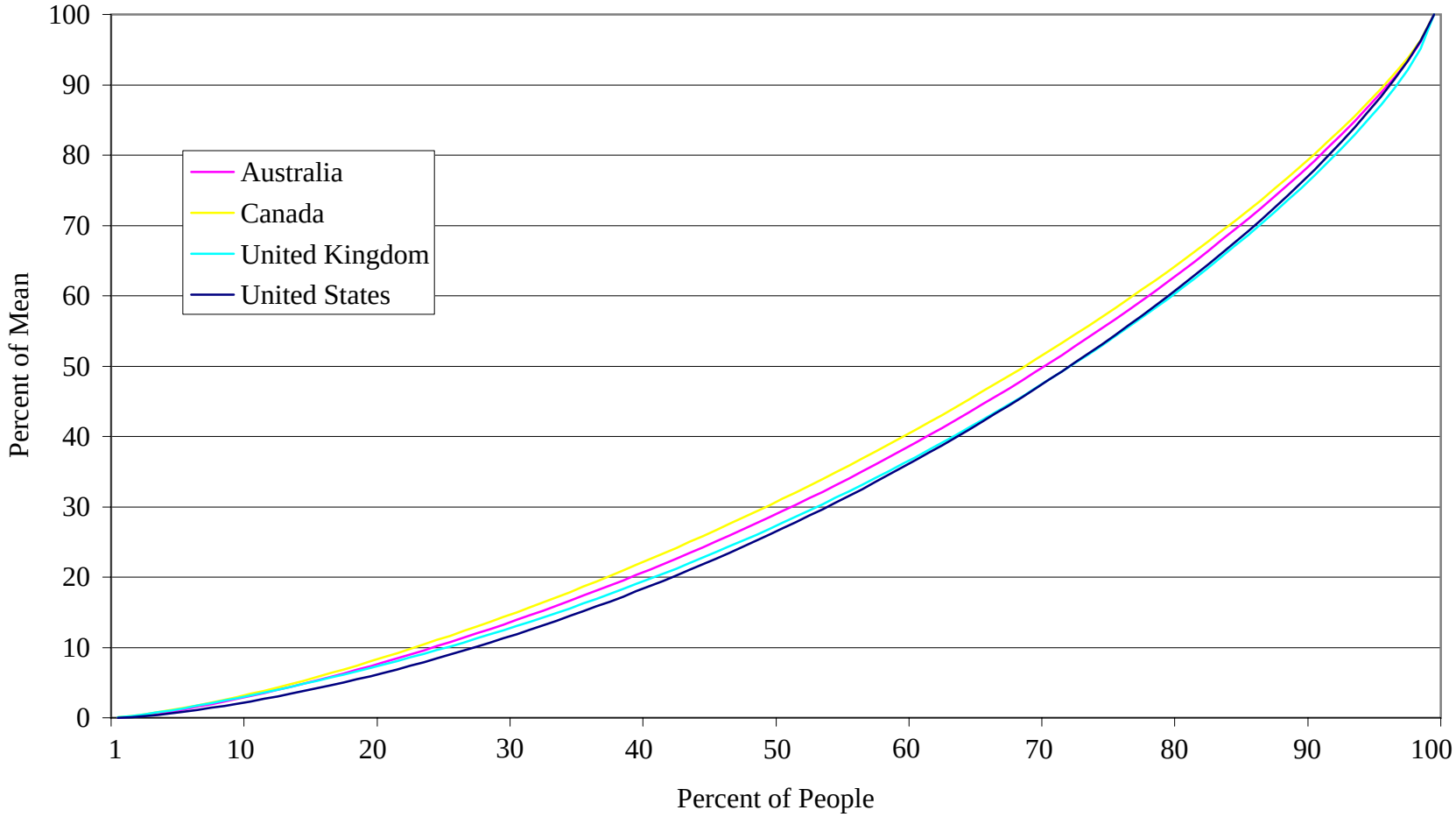


Figure 2. Decile Ratios and Gini Coefficient

(numbers given are percent of median in each nation and Gini coefficien

	P10	Length of bars represents the gap between high and low income individuals	P90	Decile Ratio	Gini Coefficient[2]
Finland 1991	57		157	2.75	0.223
Sweden 1992	57		159	2.78	0.229
Belgium 1992	58		163	2.79	0.230
Norway 1995	55		157	2.85	0.242
Denmark 1992	54		155	2.86	0.239
Luxembourg 1994	59		173	2.93	0.235
The Netherlands 1991	57		173	3.05	0.249
Italy 1991	56		176	3.14	0.255
Taiwan 1995	56		189	3.38	0.277
Switzerland 1982	54		185	3.43	0.311
New Zealand 1987/1988	54		187	3.46	NA
Germany 1994	46		177	3.84	0.300
Canada 1994	47		185	3.93	0.287
Spain 1990	49		198	4.04	0.306
France 1989	45		185	4.11	0.324
Israel 1992	50		205	4.12	0.305
Japan 1992	46		192	4.17	0.315
Ireland 1987	50		209	4.18	0.328
Australia 1989	45		193	4.30	0.308
United Kingdom 1995	46		210	4.56	0.346
United States 1994	34		219	6.44	0.368
		0 50 100 150 200 250			
Average[1]	52		181	3.53	0.279

Source: Authors' calculations using the Luxembourg Income Study database; Japanese data courtesy of Isikawa (1996); New Zealand da comes from Atkinson, Rainwater and Smeeding (1995) Chapter 4.

[1]Simple, average, excluding the United States.

[2]Gini coefficients are based on incomes which are bottom coded at 1 percent of disposable income and top coded at 10 times the median disposable income.

Figure 3a
Generalized Lorenz Curves for the Nordic Countries and the United States

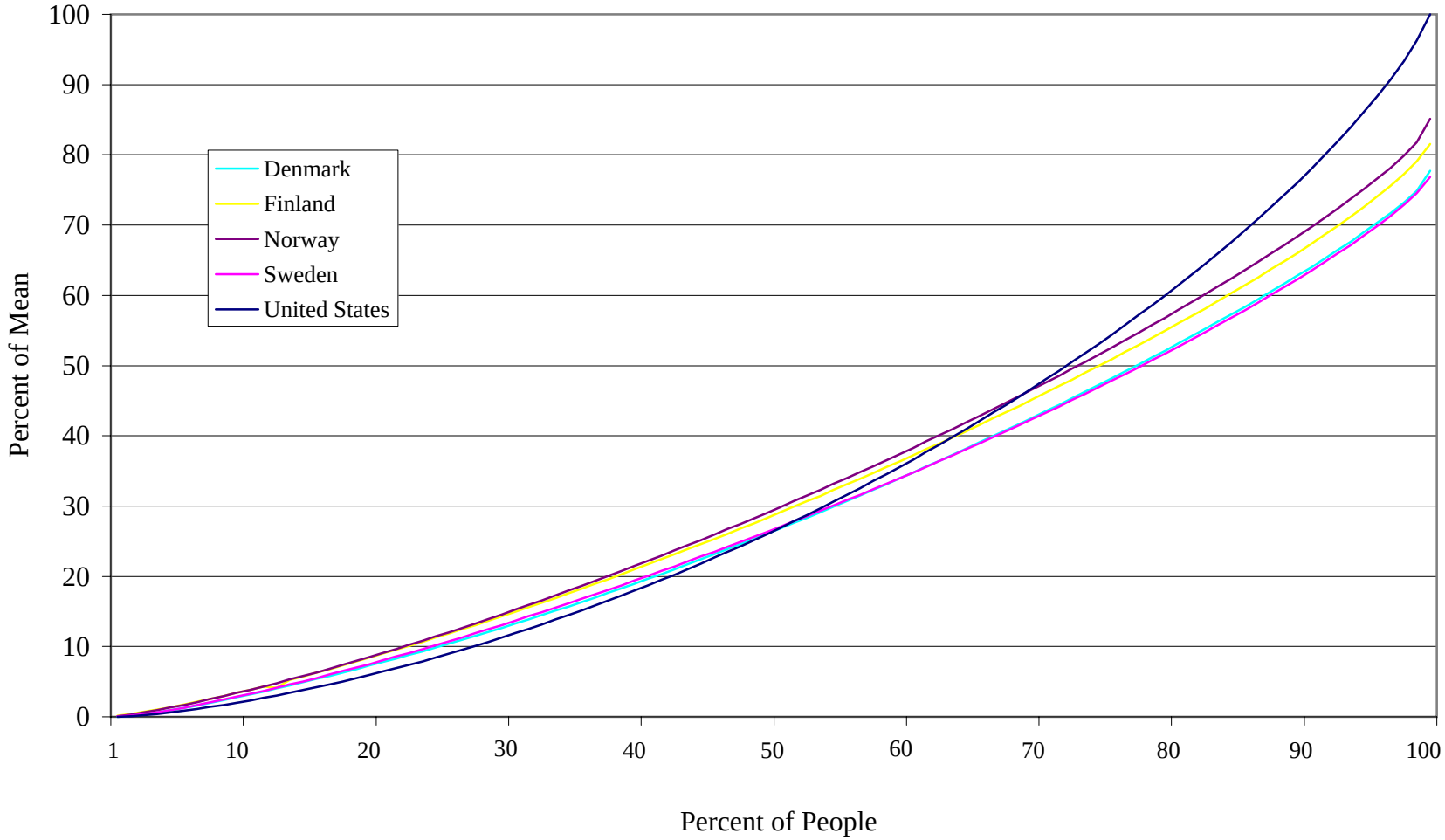


Figure 3b
Gereralized Lorenz Curves for the BENELUX Countries and the United States

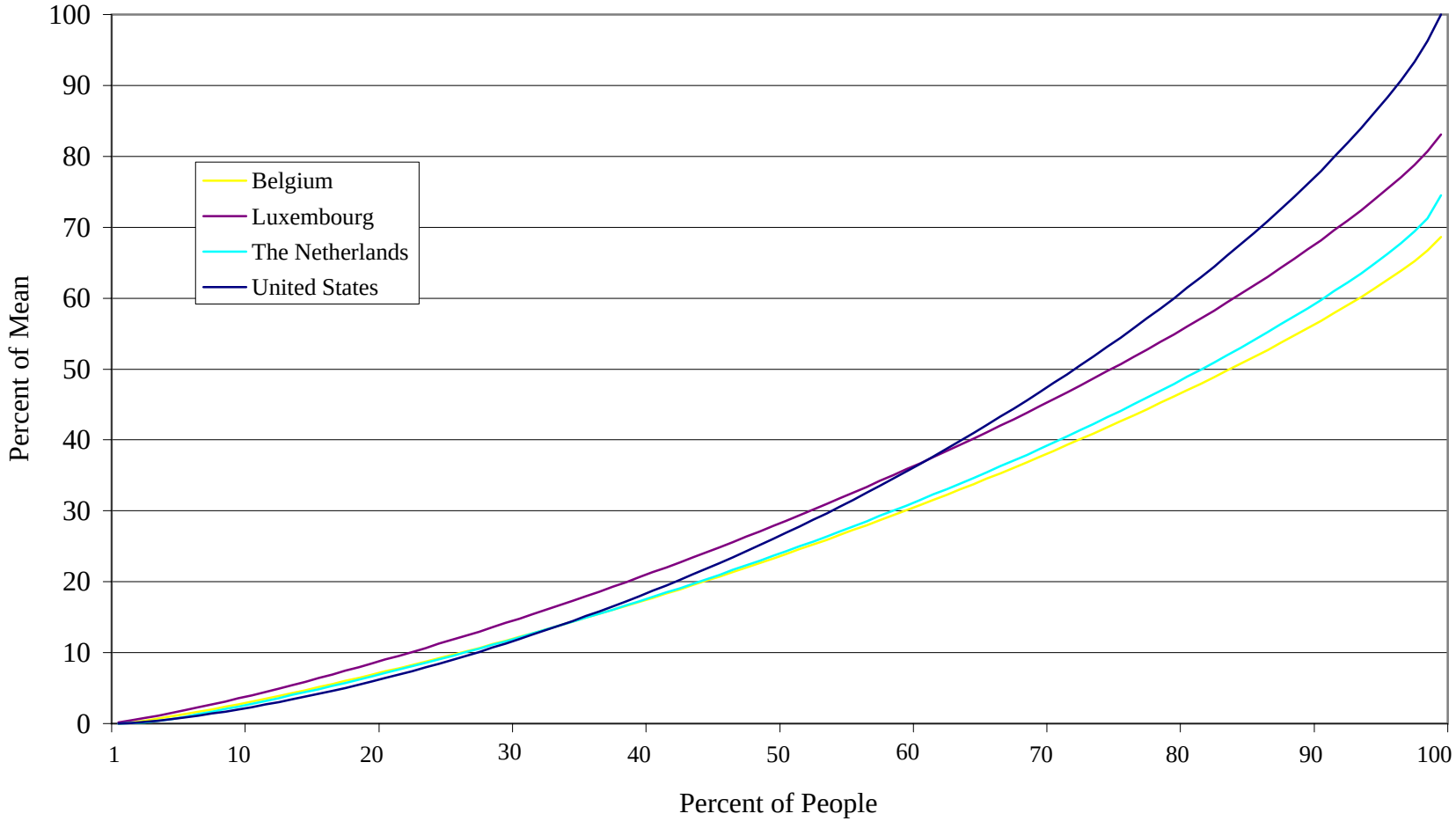


Figure 3c
Generalized Lorenz Curves for the Other European Countries and the United States

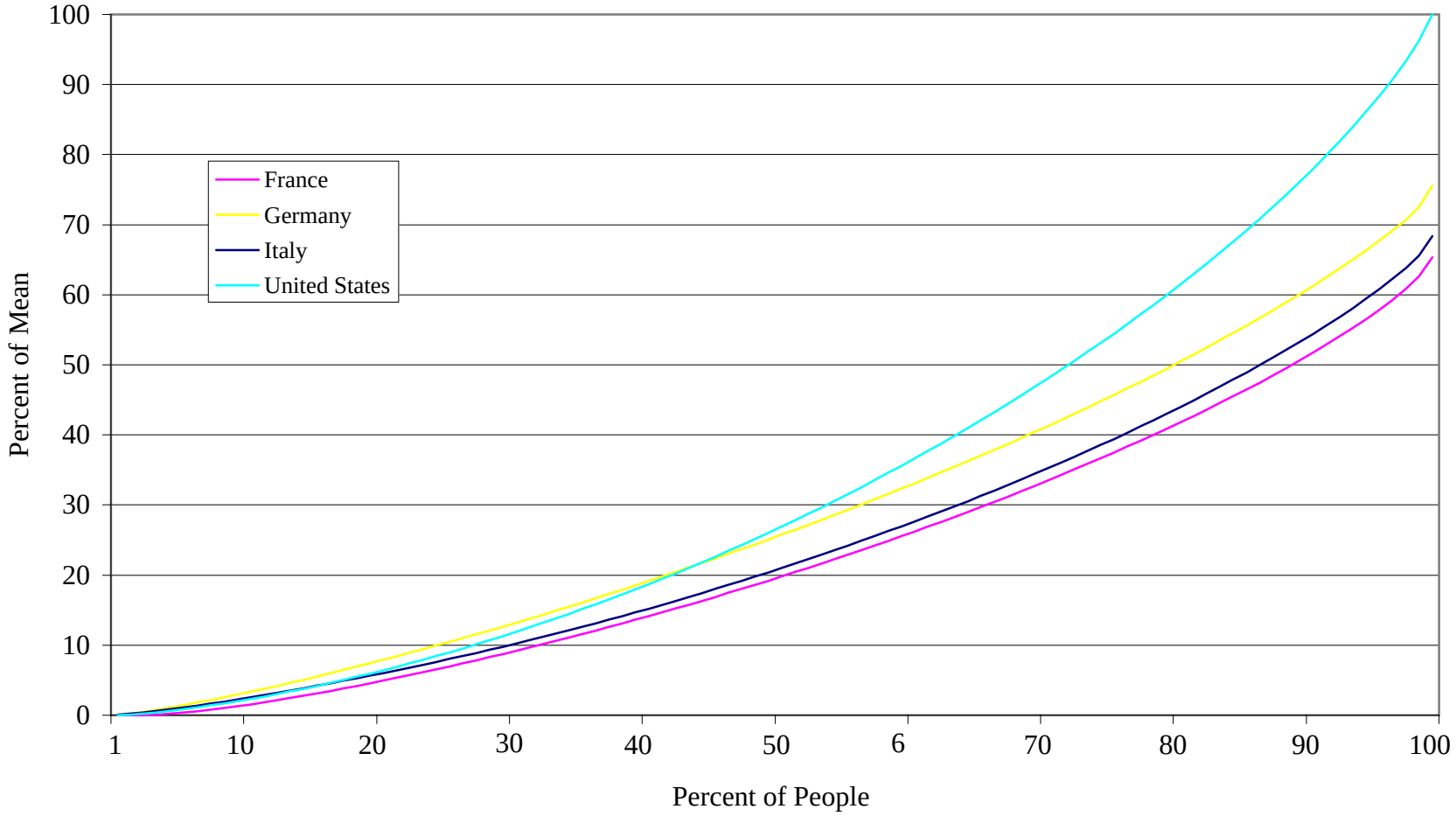


Figure 3d
Generalized Lorenz Curves for the Commonwealth Countries and the United States

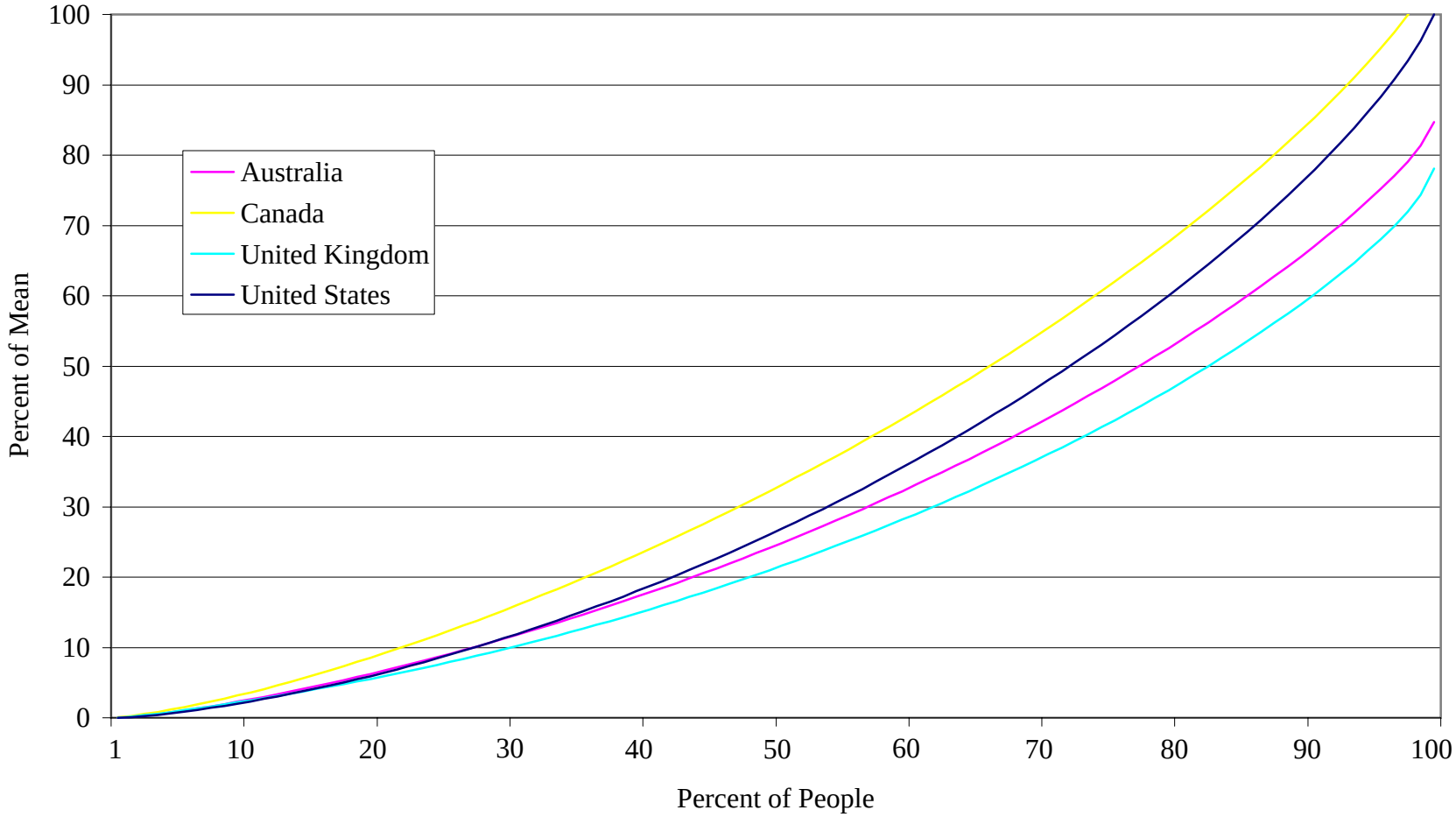
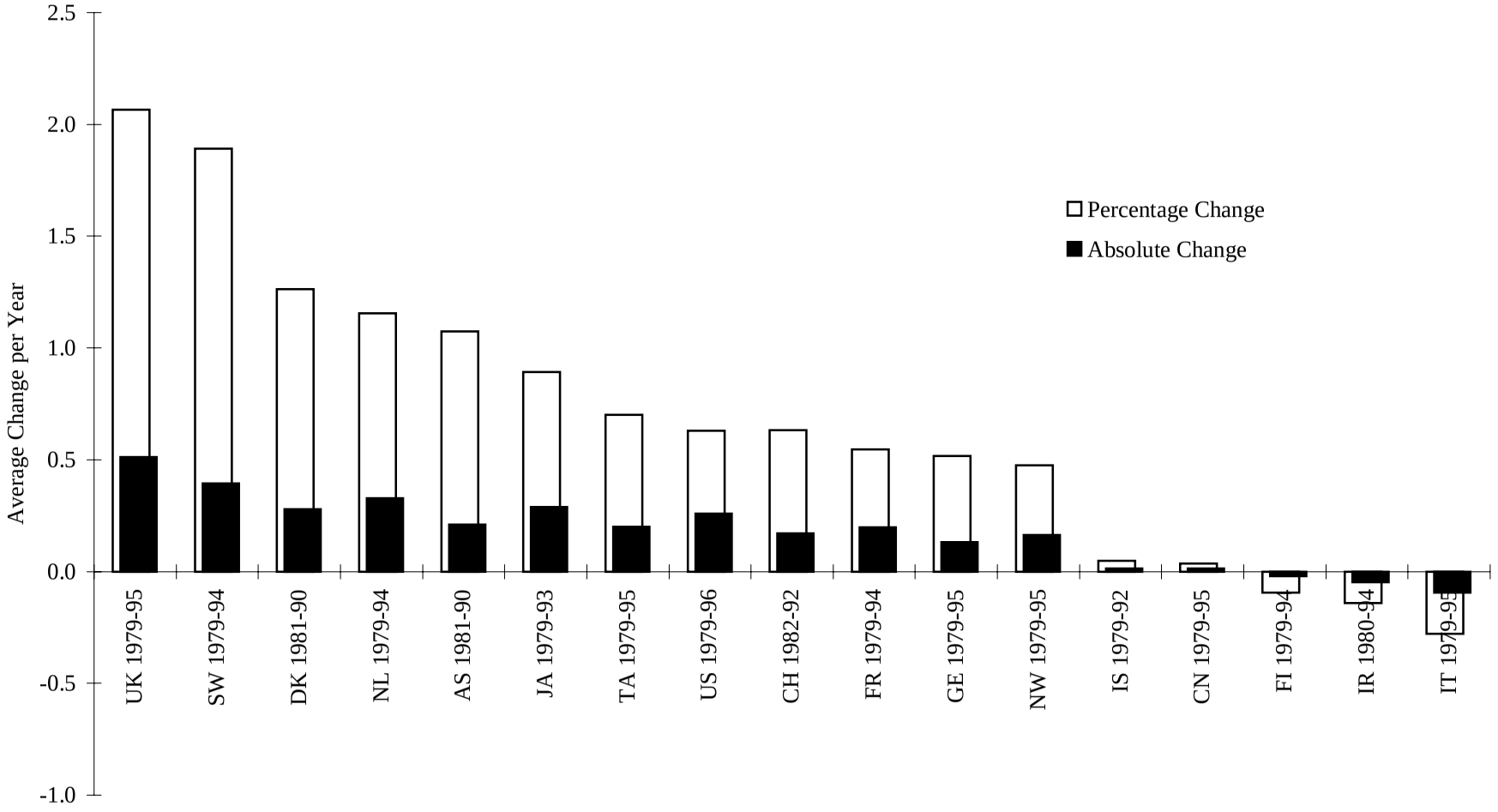


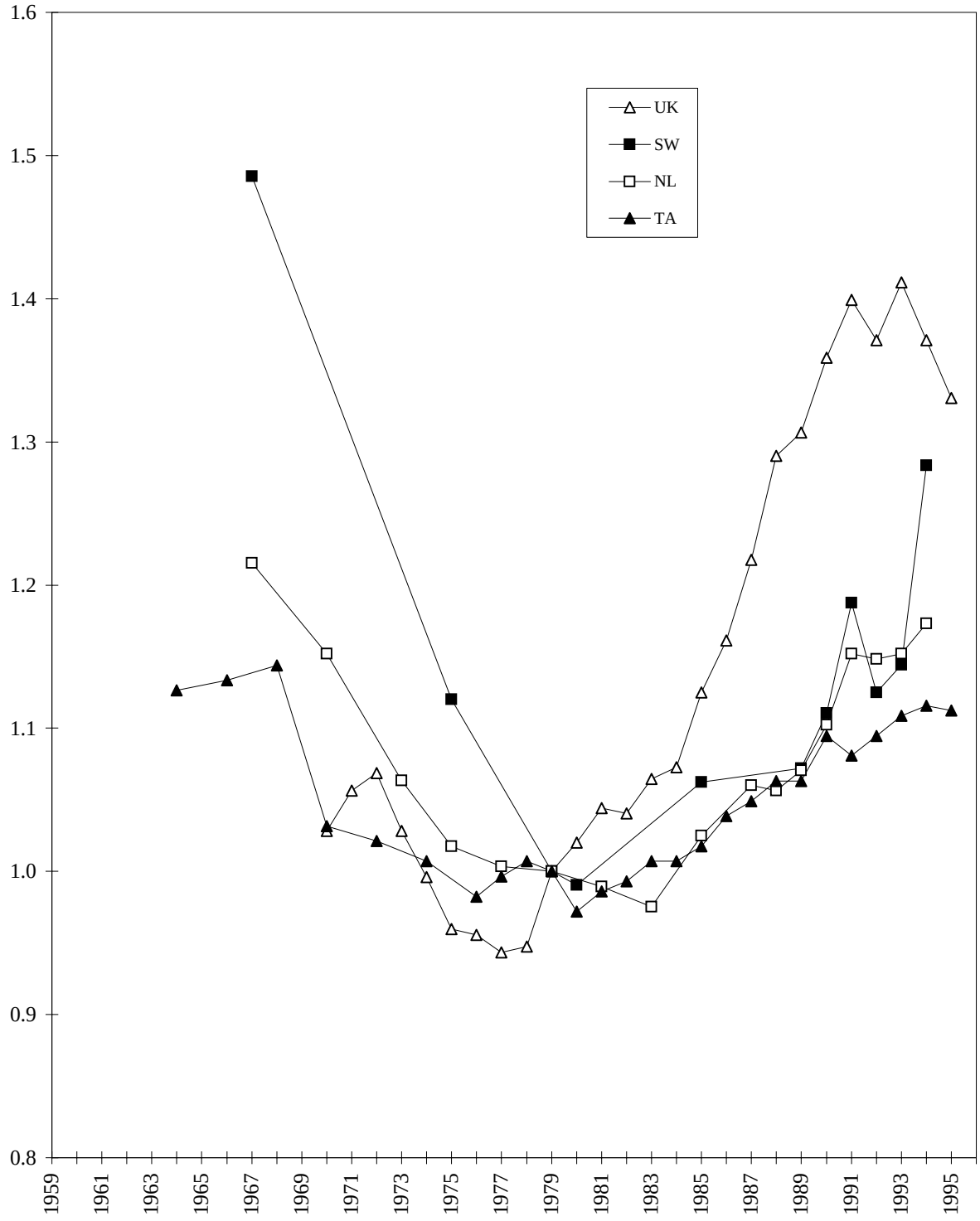
Figure 4. Trends in Disposable Income Inequality Gini Coefficients
Percentage Change Per Year and Absolute Change Per Year: 1979-1995



1Average percentage change per year equals the percentage change in the Gini coefficient over the time frame indicated divided by the number of years in the interval. Average absolute change per year equals the absolute change in the Gini coefficient over the interval multiplied by 100 and divided by the number of years in the interval.

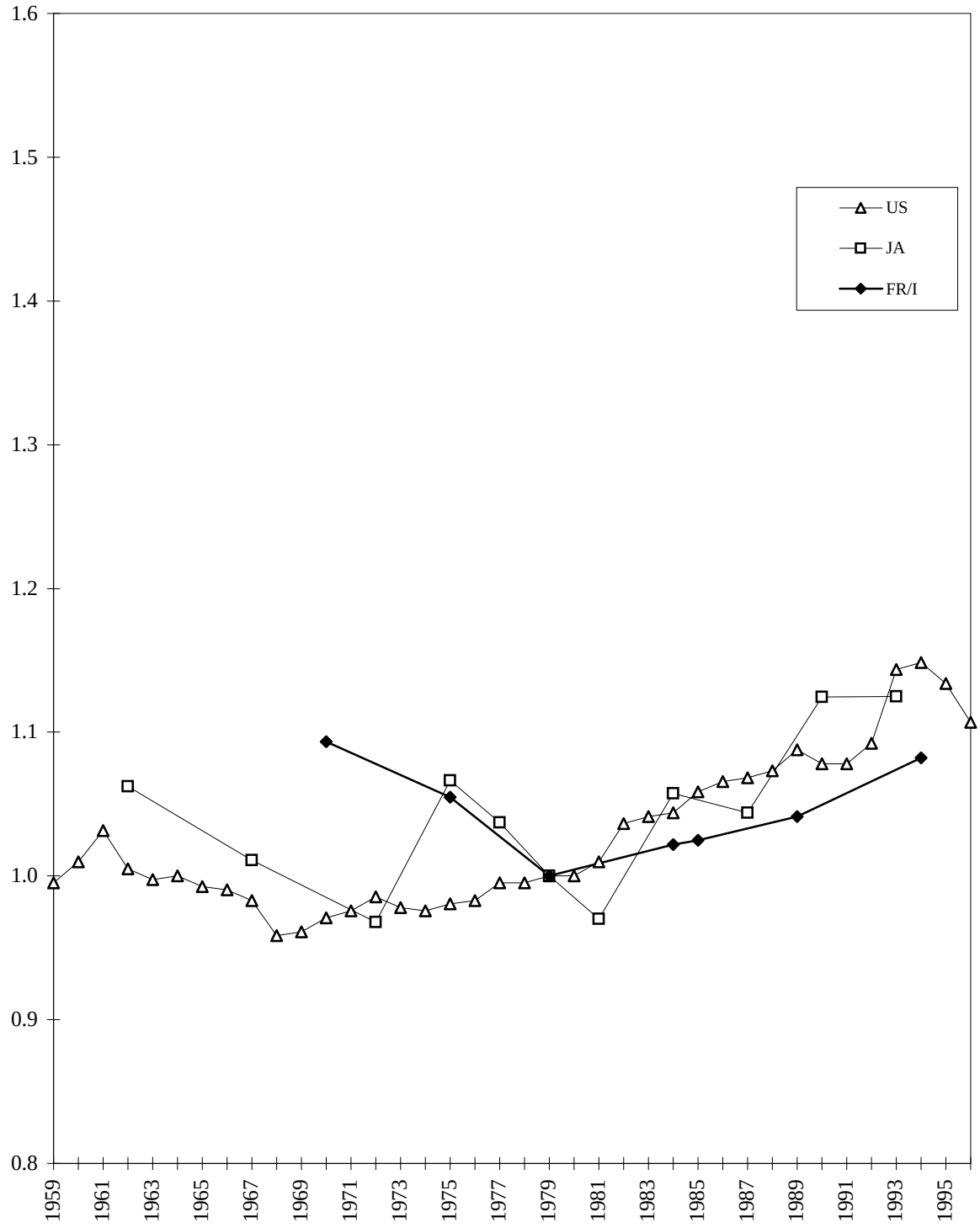
Source: See Appendix Tables A-2 and A-3.

Figure 5a. Relative Gini Comparison (1979=100) in Four Nations



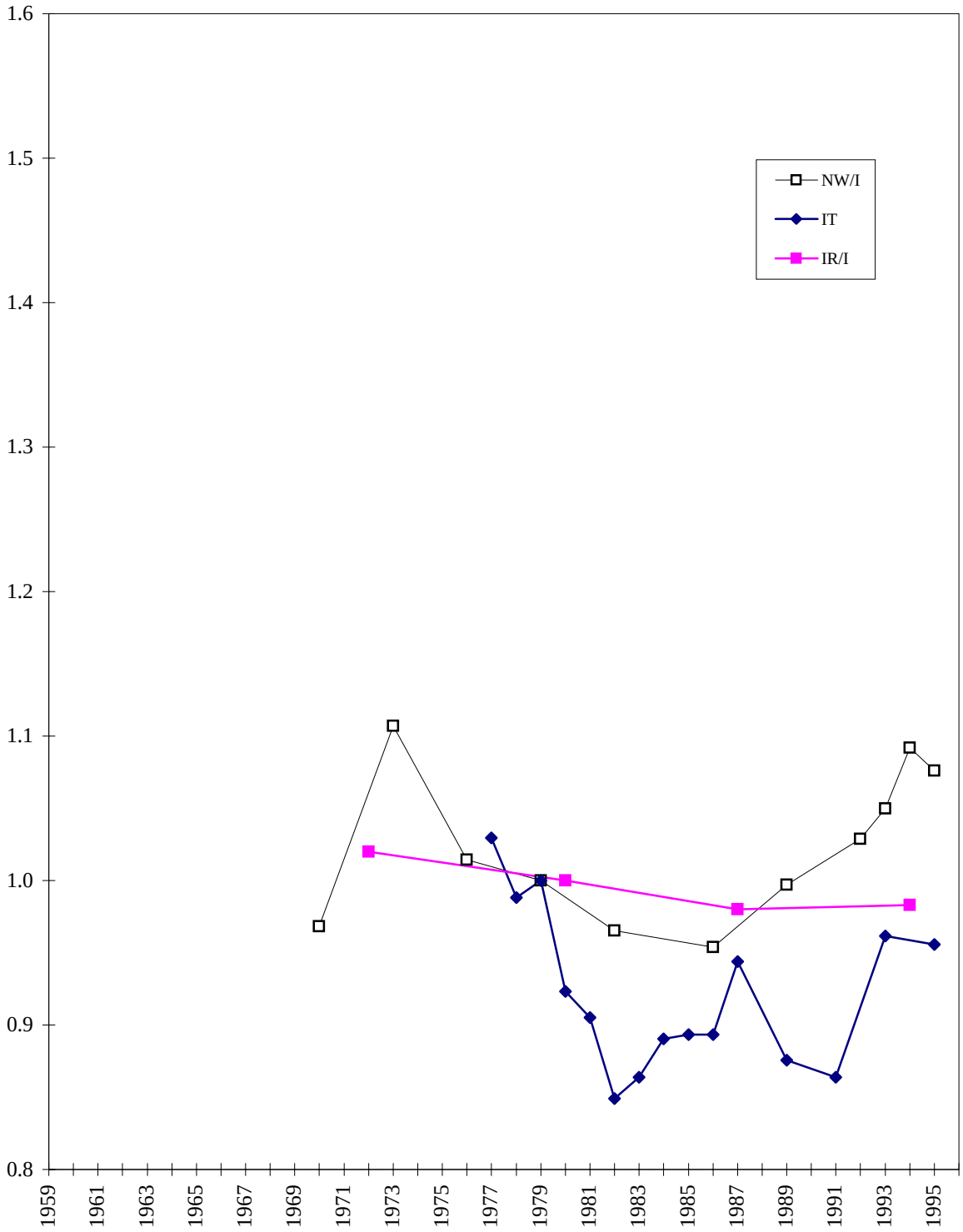
Source: See Appendix Table A-2.

Figure 5b. Relative Gini Comparison (1979=100) in Three Nations



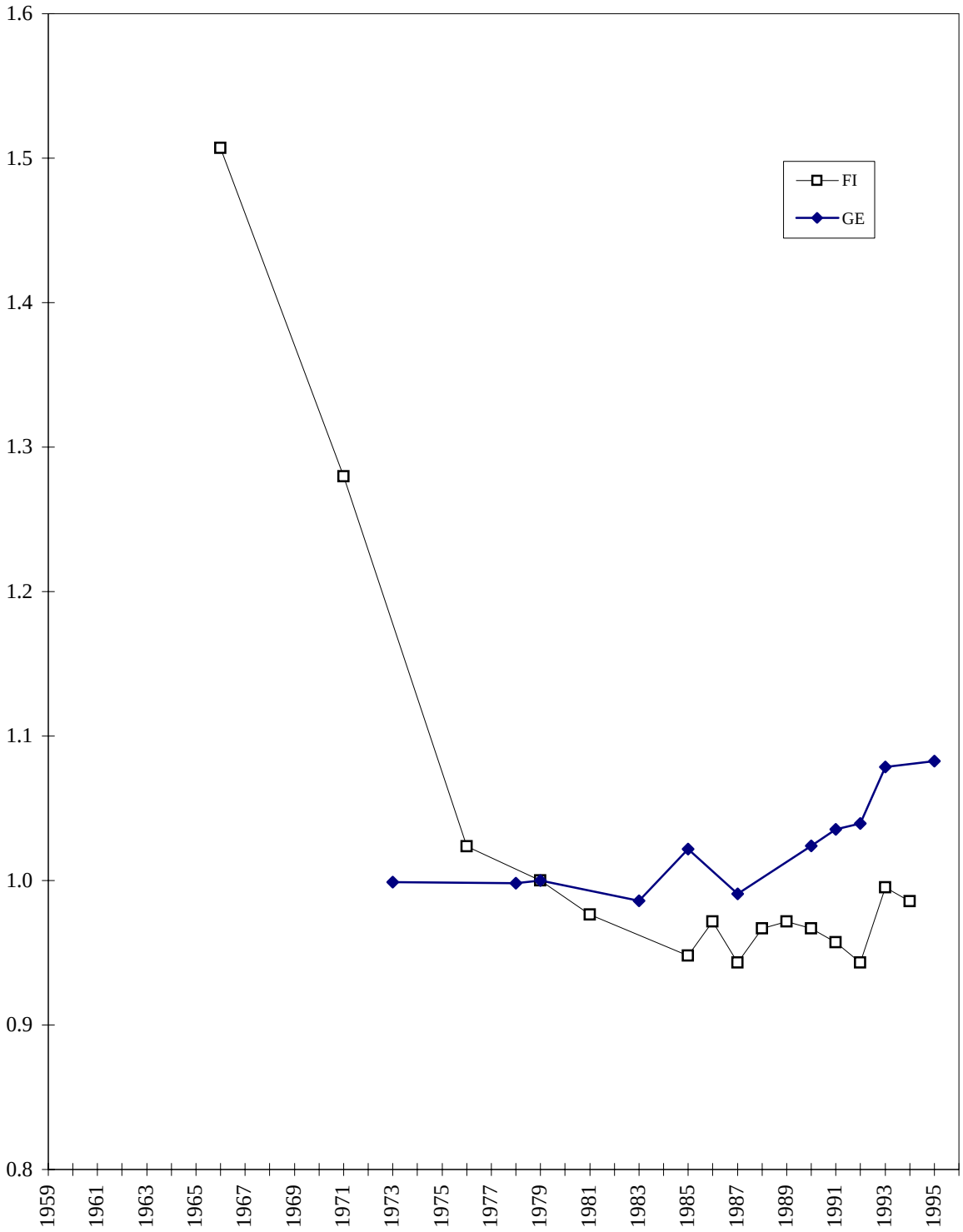
Source: See Appendix Table A-2.

Figure 5c. Relative Gini Comparison (1979=100) in Three Nations



Source: See Appendix Table A-2.

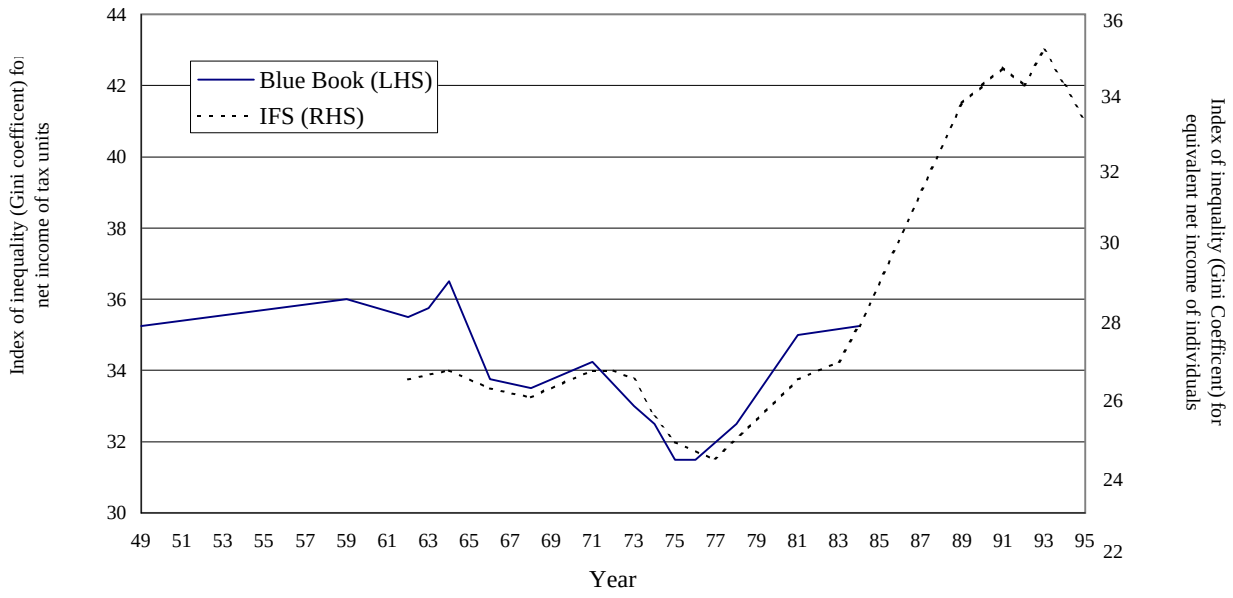
Figure 5d. Relative Gini Comparison (1979=100) in Two Nations



Source: See Appendix Table A-2.

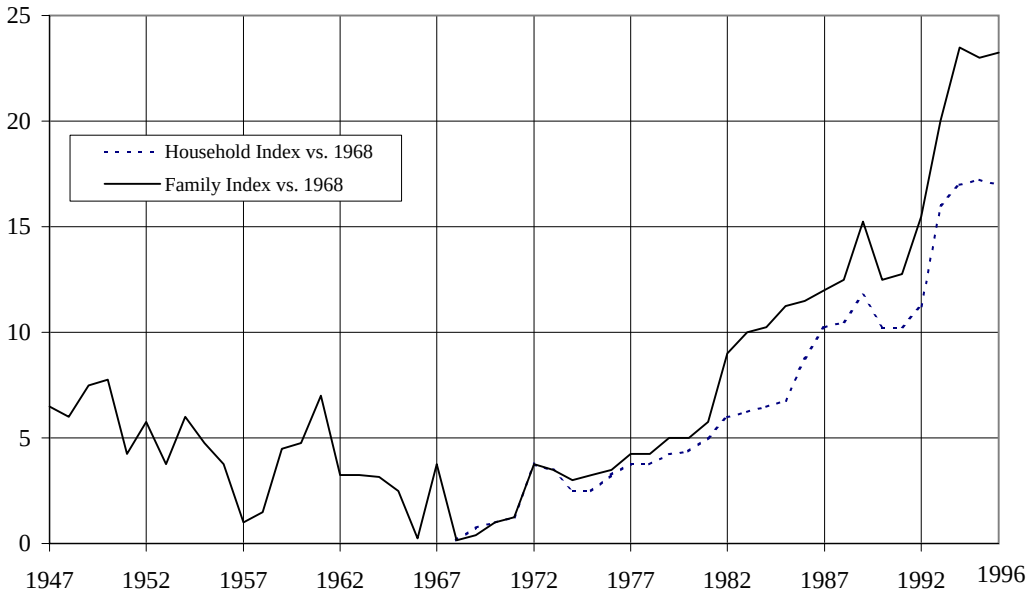
Figure 6

Change in Income Inequality in the UK



Source: Joseph Rowntree Foundation (1995); Förster (1998).

Change in Income Inequality in the United States



Source: Weinberg (1996); US Bureau of the Census (1997).

Appendix Table A-1a. Income[1] Comparisons for the Nordic Countries and the United States

	United States 1991		Sweden 1992				Finland 1991				Norway 1991				Denmark 1992			
Percentile	Nominal Value	As % of Country Median	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean
5	2,403	0.6%	32,824	1.2%	3,545	1.0%	30,919	1.7%	5,071	1.4%	46,987	1.6%	4,934	1.3%	31,261	1.2%	3,439	0.9%
10	3,734	2.0%	48,833	3.7%	5,274	2.8%	38,374	4.2%	6,293	3.4%	60,051	4.0%	6,305	3.4%	47,104	3.6%	5,181	2.8%
15	4,691	3.8%	57,926	6.6%	6,256	5.0%	43,477	7.1%	7,130	5.8%	68,391	6.8%	7,181	5.8%	55,468	6.3%	6,101	4.9%
20	5,515	5.9%	64,637	9.8%	6,981	7.5%	47,593	10.3%	7,805	8.4%	75,163	10.0%	7,892	8.5%	61,590	9.4%	6,775	7.3%
25	6,272	8.4%	70,190	13.3%	7,580	10.2%	51,037	13.8%	8,370	11.3%	80,985	13.4%	8,503	11.4%	66,720	12.7%	7,339	9.9%
30	6,997	11.3%	75,059	17.0%	8,106	13.1%	54,082	17.6%	8,869	14.3%	86,112	17.1%	9,042	14.6%	71,396	16.3%	7,854	12.7%
35	7,683	14.5%	79,393	21.0%	8,574	16.1%	56,868	21.5%	9,326	17.6%	90,741	21.1%	9,528	17.9%	75,812	20.2%	8,339	15.7%
40	8,351	18.0%	83,405	25.2%	9,008	19.4%	59,469	25.7%	9,753	21.0%	95,014	25.2%	9,976	21.5%	80,090	24.4%	8,810	19.0%
45	9,014	21.8%	87,173	29.7%	9,415	22.8%	61,889	30.1%	10,150	24.6%	99,026	29.6%	10,398	25.2%	84,170	28.9%	9,259	22.4%
50	9,674	26.0%	90,709	34.3%	9,797	26.4%	64,206	34.7%	10,530	28.3%	102,883	34.1%	10,803	29.1%	88,106	33.6%	9,692	26.1%
55	10,341	30.6%	94,111	39.1%	10,164	30.1%	66,468	39.5%	10,901	32.3%	106,662	38.9%	11,200	33.1%	91,879	38.5%	10,107	29.9%
60	11,021	35.6%	97,472	44.2%	10,527	34.0%	68,693	44.6%	11,266	36.4%	110,374	44.0%	11,589	37.4%	95,576	43.7%	10,513	33.9%
65	11,715	41.0%	100,838	49.5%	10,890	38.1%	70,912	49.9%	11,630	40.7%	114,087	49.2%	11,979	41.9%	99,200	49.1%	10,912	38.2%
70	12,425	46.8%	104,227	55.2%	11,256	42.4%	73,167	55.4%	11,999	45.2%	117,837	54.7%	12,373	46.6%	102,806	54.8%	11,309	42.6%
75	13,159	53.1%	107,673	61.0%	11,629	46.9%	75,459	61.2%	12,375	49.9%	121,686	60.6%	12,777	51.6%	106,426	60.8%	11,707	47.2%
80	13,938	60.0%	111,223	67.3%	12,012	51.7%	77,839	67.4%	12,766	54.9%	128,193	70.6%	13,460	60.1%	110,083	67.1%	12,109	52.1%
85	14,775	67.6%	114,990	73.9%	12,419	56.8%	80,379	73.9%	13,182	60.3%	129,924	73.3%	13,642	62.4%	113,855	73.7%	12,524	57.3%
90	15,713	76.1%	119,167	81.1%	12,870	62.3%	83,195	81.0%	13,644	66.1%	134,569	80.4%	14,130	68.4%	117,921	80.8%	12,971	62.8%
95	16,839	86.1%	124,072	89.1%	13,400	68.5%	86,585	89.0%	14,200	72.6%	139,976	88.3%	14,698	75.1%	122,624	88.7%	13,489	68.9%

Notes:

[1]Income is adjusted disposable personal income measured at the household level. Incomes are adjusted by E=0.5 where adjusted disposable personal income (DPI) = actual DPI divided by household size (s) to the power E: Adjusted DPI = DPI/sE

[2]Incomes were converted to US Dollars using PPPs derived from Penn World Table 5.6. The adjusted amounts were then inflated using the CPI-U-X1.

Appendix Table A-1b. Income[1] Comparisons for the BENELUX Countries and the United States

	United States 1991		Belgium 1992				The Netherlands 1991				Luxembourg 1985			
Percentile	Nominal Value	As % of Country Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean
5	2,403	0.6%	1,513	1.5%	3,783	1.0%	5,326	0.9%	2,503	0.7%	185,373	1.8%	5,561	1.5%
10	3,734	2.0%	2,032	4.0%	5,079	2.7%	9,562	3.2%	4,494	2.4%	220,594	4.3%	6,618	3.6%
15	4,691	3.8%	2,339	6.9%	5,849	4.7%	11,719	6.0%	5,508	4.4%	244,387	7.1%	7,332	5.9%
20	5,515	5.9%	2,564	10.1%	6,410	6.9%	13,160	8.9%	6,185	6.7%	263,082	10.2%	7,892	8.5%
25	6,272	8.4%	2,742	13.4%	6,855	9.2%	14,311	12.1%	6,726	9.0%	278,545	13.5%	8,356	11.2%
30	6,997	11.3%	2,897	17.0%	7,243	11.7%	15,311	15.6%	7,196	11.6%	293,085	17.1%	8,793	14.2%
35	7,683	14.5%	3,046	20.9%	7,615	14.3%	16,221	19.3%	7,624	14.4%	306,617	20.8%	9,199	17.3%
40	8,351	18.0%	3,190	25.0%	7,976	17.2%	17,071	23.2%	8,023	17.3%	319,809	24.8%	9,594	20.6%
45	9,014	21.8%	3,329	29.4%	8,322	20.1%	17,895	27.3%	8,411	20.4%	332,431	29.1%	9,973	24.1%
50	9,674	26.0%	3,463	33.9%	8,657	23.3%	18,695	31.7%	8,787	23.6%	345,189	33.5%	10,356	27.9%
55	10,341	30.6%	3,596	38.8%	8,989	26.6%	19,482	36.4%	9,157	27.1%	357,741	38.2%	10,732	31.8%
60	11,021	35.6%	3,728	43.8%	9,319	30.1%	20,275	41.3%	9,529	30.8%	370,324	43.2%	11,110	35.9%
65	11,715	41.0%	3,861	49.2%	9,653	33.8%	21,081	46.5%	9,908	34.7%	383,178	48.4%	11,495	40.2%
70	12,425	46.8%	4,000	54.9%	10,001	37.7%	21,902	52.1%	10,294	38.8%	396,455	53.9%	11,894	44.8%
75	13,159	53.1%	4,141	60.9%	10,353	41.8%	22,770	58.0%	10,702	43.2%	410,416	59.8%	12,312	49.7%
80	13,938	60.0%	4,286	67.2%	10,715	46.1%	23,685	64.3%	11,132	47.9%	425,116	66.1%	12,753	54.9%
85	14,775	67.6%	4,438	73.9%	11,094	50.7%	24,657	71.2%	11,589	53.0%	441,569	72.9%	13,247	60.6%
90	15,713	76.1%	4,604	81.2%	11,509	55.7%	25,736	78.6%	12,096	58.6%	460,176	80.4%	13,805	66.9%
95	16,839	86.1%	4,799	89.4%	11,998	61.3%	26,994	87.1%	12,687	64.8%	481,806	88.9%	14,454	73.9%

Notes:

[1]Income is adjusted disposable personal income measured at the household level. Incomes are adjusted by E=0.5 where adjusted disposable personal income (DPI) = actual DPI divided by household size (s) to the power E: Adjusted DPI = DPI/sE

[2]Incomes were converted to US Dollars using PPPs derived from Penn World Table 5.6. The adjusted amounts were then inflated using the CPI-U-X1.

Appendix Table A-1c. Income[1] Comparisons for Other European Countries and the United States

	United States 1991		Italy 1991				France 1984				Germany 1989			
Percentile	Nominal Value	As % of Country Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $	As % of US Mean
5	2,403	0.6%	4,759	1.2%	3,141	0.8%	4,017	0.3%	767	0.2%	8,064	1.5%	4,097	1.1%
10	3,734	2.0%	6,303	3.3%	4,160	2.2%	12,254	1.9%	2,341	1.3%	10,749	3.9%	5,460	2.9%
15	4,691	3.8%	7,233	5.6%	4,774	3.9%	17,966	4.2%	3,432	2.8%	12,349	6.7%	6,273	5.1%
20	5,515	5.9%	7,957	8.3%	5,251	5.7%	22,179	7.0%	4,236	4.6%	13,567	9.8%	6,892	7.4%
25	6,272	8.4%	8,582	11.1%	5,664	7.6%	25,541	10.0%	4,878	6.6%	14,558	13.2%	7,396	9.9%
30	6,997	11.3%	9,174	14.3%	6,055	9.8%	28,332	13.4%	5,412	8.7%	15,418	16.7%	7,832	12.6%
35	7,683	14.5%	9,750	17.7%	6,435	12.1%	30,821	17.0%	5,887	11.1%	16,199	20.5%	8,229	15.5%
40	8,351	18.0%	10,333	21.5%	6,820	14.7%	33,133	20.9%	6,328	13.6%	16,948	24.5%	8,610	18.5%
45	9,014	21.8%	10,913	25.5%	7,203	17.4%	35,299	25.0%	6,742	16.3%	17,658	28.7%	8,970	21.7%
50	9,674	26.0%	11,487	29.8%	7,581	20.4%	37,376	29.4%	7,139	19.2%	18,351	33.2%	9,322	25.1%
55	10,341	30.6%	12,063	34.5%	7,962	23.6%	39,398	34.1%	7,525	22.3%	19,032	37.8%	9,668	28.6%
60	11,021	35.6%	12,641	39.4%	8,343	26.9%	41,390	39.1%	7,905	25.5%	19,709	42.8%	10,012	32.3%
65	11,715	41.0%	13,234	44.7%	8,734	30.5%	43,397	44.4%	8,289	29.0%	20,400	47.9%	10,363	36.2%
70	12,425	46.8%	13,842	50.4%	9,135	34.4%	45,441	50.1%	8,679	32.7%	21,106	53.4%	10,722	40.4%
75	13,159	53.1%	14,474	56.4%	9,553	38.5%	47,543	56.1%	9,081	36.6%	21,841	59.2%	11,095	44.8%
80	13,938	60.0%	15,141	62.9%	9,993	43.0%	49,736	62.6%	9,500	40.9%	23,127	69.4%	11,748	52.5%
85	14,775	67.6%	15,865	70.1%	10,471	47.9%	52,093	69.7%	9,950	45.5%	23,478	72.2%	11,927	54.5%
90	15,713	76.1%	16,661	77.9%	10,997	53.2%	54,739	77.5%	10,455	50.6%	24,418	79.5%	12,404	60.1%
95	16,839	86.1%	17,608	86.9%	11,621	59.4%	57,877	86.5%	11,054	56.5%	25,541	87.7%	12,975	66.3%

Notes:

[1]Income is adjusted disposable personal income measured at the household level. Incomes are adjusted by E=0.5 where adjusted disposable personal income (DPI) = actual DPI divided by household size (s) to the power E: Adjusted DPI = DPI/sE

[2]Incomes were converted to US Dollars using PPPs derived from Penn World Table 5.6. The adjusted amounts were then inflated using the CPI-U-X1.

Appendix Table A-1d. Income[1] Comparisons for the Commonwealth Countries

	United States 1991		Australia 1989				Canada 1991				United Kingdom 1991			
Percentile	Nominal Value	As % of Country Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean	Nominal Value	As % of Country Mean	Value in 1991 US $[2]	As % of US Mean
5	2,403	0.6%	3,297	0.9%	2,815	0.8%	5,138	1.1%	4,311	1.2%	1,925	1.1%	3,100	0.8%
10	3,734	2.0%	4,959	2.7%	4,235	2.3%	6,987	3.0%	5,862	3.2%	2,535	2.8%	4,081	2.2%
15	4,691	3.8%	5,976	4.9%	5,103	4.1%	8,330	5.3%	6,989	5.6%	2,903	4.8%	4,674	3.8%
20	5,515	5.9%	6,787	7.4%	5,796	6.2%	9,459	8.0%	7,936	8.5%	3,195	7.1%	5,144	5.5%
25	6,272	8.4%	7,501	10.2%	6,406	8.6%	10,414	11.0%	8,738	11.8%	3,469	9.6%	5,585	7.5%
30	6,997	11.3%	8,148	13.3%	6,958	11.2%	11,264	14.3%	9,451	15.3%	3,739	12.4%	6,020	9.7%
35	7,683	14.5%	8,758	16.6%	7,479	14.1%	12,056	17.9%	10,115	19.0%	4,010	15.6%	6,455	12.2%
40	8,351	18.0%	9,346	20.3%	7,981	17.2%	12,819	21.7%	10,755	23.1%	4,286	19.0%	6,900	14.8%
45	9,014	21.8%	9,926	24.2%	8,477	20.5%	13,550	25.8%	11,369	27.5%	4,562	22.8%	7,345	17.8%
50	9,674	26.0%	10,505	28.5%	8,971	24.1%	14,264	30.2%	11,967	32.2%	4,843	26.9%	7,797	21.0%
55	10,341	30.6%	11,089	33.1%	9,470	28.0%	14,971	34.9%	12,560	37.2%	5,128	31.3%	8,256	24.4%
60	11,021	35.6%	11,690	38.1%	9,983	32.2%	15,684	39.9%	13,159	42.5%	5,420	36.1%	8,726	28.2%
65	11,715	41.0%	12,306	43.4%	10,509	36.8%	16,414	45.2%	13,771	48.2%	5,720	41.2%	9,209	32.2%
70	12,425	46.8%	12,940	49.2%	11,050	41.6%	17,154	50.9%	14,392	54.2%	6,032	46.8%	9,712	36.6%
75	13,159	53.1%	13,600	55.3%	11,614	46.9%	17,923	57.0%	15,037	60.7%	6,363	52.9%	10,245	41.3%
80	13,938	60.0%	14,293	62.0%	12,206	52.5%	18,730	63.5%	15,715	67.6%	6,720	59.6%	10,819	46.6%
85	14,775	67.6%	15,042	69.4%	12,846	58.7%	19,600	70.6%	16,444	75.2%	7,113	67.1%	11,451	52.4%
90	15,713	76.1%	15,864	77.5%	13,548	65.6%	20,569	78.5%	17,257	83.6%	7,547	75.3%	12,150	58.8%
95	16,839	86.1%	16,828	86.7%	14,371	73.5%	21,702	87.4%	18,208	93.1%	8,062	84.9%	12,979	66.3%

Notes:

[1]Income is adjusted disposable personal income measured at the household level. Incomes are adjusted by E=0.5 where adjusted disposable personal income (DPI) = actual DPI divided by household size (s) to the power E: Adjusted DPI = DPI/sE

[2]Incomes were converted to US Dollars using PPPs derived from Penn World Table 5.6. The adjusted amounts were then inflated using the CPI-U-X1.

Appendix Table A-2
Relative GINI Coefficients (1979=100)

	US	JA	UK	NW/I	FI	SW	GE	FR/I	CN	DK	NL	IT	IR/I	CH	IS	TA	AS
1959	0.9951																
1960	1.0097																
1961	1.0316																
1962	1.0049	1.0623															
1963	0.9976																
1964	1.0000															1.1263	
1965	0.9927																
1966	0.9903				1.5071											1.1333	
1967	0.9830	1.0111				1.4856					1.2155						
1968	0.9586															1.1439	
1969	0.9611																
1970	0.9708		1.0282	0.9682				1.0934			1.1519					1.0316	
1971	0.9757		1.0565		1.2796				1.0507								
1972	0.9854	0.9679	1.0685						1.0366				1.0200			1.0211	
1973	0.9781		1.0282	1.1069			0.9988		1.0366		1.0636						
1974	0.9757		0.9960						1.0225							1.0070	
1975	0.9805	1.0664	0.9597			1.1202		1.0549	1.0254		1.0177						
1976	0.9830		0.9556	1.0145	1.0237				1.0535							0.9825	
1977	0.9951	1.0373	0.9435						1.0197		1.0035	1.0296				0.9965	
1978	0.9951		0.9476				0.9980		1.0338			0.9882				1.0070	
1979	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000			1.0000	1.0000	
1980	1.0000		1.0202			0.9904			1.0085			0.9231	1.0000			0.9719	1.0000
1981	1.0097	0.9701	1.0444		0.9763				0.9887	1.0000	0.9894	0.9053				0.9860	
1982	1.0365		1.0403	0.9653					0.9944	0.9864		0.8491		1.0000		0.9930	
1983	1.0414		1.0645				0.9858		1.0225	0.9773	0.9753	0.8639				1.0070	
1984	1.0438	1.0574	1.0726					1.0220	1.0113	0.9955		0.8905				1.0070	
1985	1.0584		1.1250		0.9479	1.0625	1.0217	1.0250	1.0085	1.0045	1.0247	0.8935				1.0175	1.0280
1986	1.0657		1.1613	0.9538	0.9716				1.0113	1.0045		0.8935			1.0188	1.0386	
1987	1.0681	1.0438	1.2177		0.9431		0.9909		1.0056	1.0182	1.0601	0.9438	0.9800			1.0491	
1988	1.0730		1.2903		0.9668				1.0000	1.0545	1.0565					1.0632	
1989	1.0876		1.3065	0.9971	0.9716	1.0721		1.0412	0.9915	1.0636	1.0707	0.8757				1.0632	1.0730
1990	1.0779	1.1244	1.3589		0.9668	1.1106	1.0240		0.9915	1.1136	1.1025					1.0947	
1991	1.0779		1.3992		0.9573	1.1875	1.0354		1.0056		1.1519	0.8639				1.0807	
1992	1.0925		1.3710	1.0289	0.9431	1.1250	1.0394		1.0028		1.1484			1.0632	1.0063	1.0947	
1993	1.1436	1.1250	1.4113	1.0500	0.9953	1.1442	1.0787		1.0085		1.1519	0.9615				1.1088	
1994	1.1484		1.3710	1.0920	0.9858	1.2837		1.0820	0.9972		1.1731		0.9830			1.1158	
1995	1.1338		1.3306	1.0760			1.0827		1.0056			0.9556				1.1123	
1996	1.1071																

Sources:

US	US Census Bureau (1997)
JA	Ishikawa (1996)
UK	Office of National Statistics (LIS 154)
NW/I	Interpolated series: See Appendix Table 3
FI	Uusitalo (1996)
SW	Gottschalk and Smeeding (1997a)
GE	Hauser and Becker (1994); Gottschalk and Smeeding (1997a)
FR/I	Interpolated series: See Appendix Table 3
CN	Gottschalk and Smeeding (1997); Statistics Canada (1996)
DK	Aagerge et al. (1996); Epland (1997)
NL	Gottschalk and Smeeding (1997a)
IT	Brandolini and Sestito (1997)
IR/I	Interpolated series: See Appendix Table 3
CH	Atkinson (1997b)
IS	Gottschalk and Smeeding (1997)
TA	Gottschalk and Smeeding (1997)
AS	LIS (1998)

Appendix Table A-3

	NW/I	NW	NW/2	FR/I	FR	FR/2	IR/I	IR	IR/2
1959									
1960									
1961									
1962									
1963									
1964									
1965									
1966									
1967									
1968									
1969									
1970	0.9682	0.9682		1.0934	1.0934				
1971									
1972							1.0200	1.0200	
1973	1.1069	1.1069							
1974									
1975				1.0549	1.0549				
1976	1.0145	1.0145							
1977									
1978									
1979	1.0000	1.0000		1.0000	1.0000				
1980							1.0000	1.0000	
1981									
1982	0.9653	0.9653							
1983									
1984				1.0220	1.0220	1.0000			
1985				1.0250		1.0032			
1986	0.9538	0.9538	1.0000						
1987			1.0043				0.9800	0.9800	1.0000
1988			0.9701						
1989	0.9971	0.9971	1.0470	1.0412	1.0412	1.0195			
1990			1.0299						
1991			1.0427						
1992	1.0289	1.0289	1.0385						
1993	1.0500		1.0598						
1994	1.0920		1.1026	1.0820		1.0584	0.9830		1.0031
1995	1.0760		1.0855						
1996									

Sources:

NW-I	Interpolated series: Gottschalk and Smeeding (1997a); Epland (1997)
NW	Gottschalk and Smeeding (1997a)
NW/2	Epland (1997)
FR-I	Interpolated series: Gottschalk and Smeeding (1997a); Förster (1998)
FR	Gottschalk and Smeeding (1997)
FR/2	Förster (1998)
IR-I	Interpolated series; Gottschalk and Smeeding (1997a); Atkinson (1997b)
IR	Gottschalk and Smeeding (1997a)
IR/2	Atkinson (1997b)