GROWTH, INCOME DISTRIBUTION, AND WELL-BEING: COMPARISONS ACROSS SPACE AND TIME

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Abstract

We use several well-being measures that combine average income with a measure of inequality to undertake international, intertemporal, and global comparisons of well-being. The conclusions emerging from the analysis are that our well-being measures drastically change our impression of levels of well-being at the national and, more so, at the global level. They also significantly affect the ranking of countries, when compared to rankings based on real incomes. The impact on these measures on temporal trends in well-being is smaller on average, but significant for a number of countries where inequality changed considerably in past decades. These results appear not very sensitive to the data on inequality which this analysis is based upon. However, since the inclusion of inequality has an important impact on wellbeing comparisons and it is of great importance to generate more consistent and intertemporally as well as internationally comparable data on inequality that are necessary for such comparisons.

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1 Introduction

Despite its well-known short-comings, GNP per capita is still the most widely used indicator for comparisons of well-being across countries; and the per capita growth rate is still the most common indicator of changes in well-being.[1]

The exclusive reliance on this measure is largely due to pragmatic grounds. GNP (and GDP) are important measures of production possibility and business cycles, which ensure that great efforts are made to measure them timely, accurately, and according to internationally agreed standards. With these data readily available, it is tempting to rely on them for international and intertemporal comparisons of well-being. Moreover, it is argued by many that GNP per capita and growth of per capita income is still the best available proxy for changes in well-being as it is highly correlated with more complete or more broad-based measures of well-being (e.g. Dollar and Kraay, 2000; Ravallion, 1997).

Nevertheless, it continues to be the case that its neglect of income distribution is one of the most serious short-comings of GNP as an indicator of welfare. In particular, a broad range of philosophical approaches to the measurement of welfare (ranging from utilitarianism with some very reasonable assumptions about utility functions to Rawlsian reasoning or Sen's capability approach) would suggest that, ceteris paribus, high economic inequality reduces aggregate well-being. In fact, there exists a range of measures for well-being that make use of this insight and combine mean income with some measure of income inequality to arrive at better measures of welfare than average income alone (e.g. Atkinson, 1970; Sen, 1973; Dagum, 1990; Ahluwalia and Chenery, 1974).

In the past the application of those measures was limited, mainly because of lack of data on income distribution. Recent years, however, have seen great advances being made in the generation of data on income inequality (e.g. Deininger and Squire, 1996; Gottschalk and Smeeding, 1997; WIID, 2000). Thus it seems natural to apply well-being measures that combine GNP per capita and income distribution to these new data and investigate to what extent these measures will generate comparisons of well-being across space and time that are substantially different from pure per capita income comparisons. This exercise is the purpose of this paper.

We find that the measures that include income inequality in the assessment of well-being have a significant influence on **international comparisons** of well-being. Several countries, including Brazil, Mexico, Chile, but also the US have considerably lower levels of well-being and thus rankings of well-being than suggested by per capita income, while other countries, including Indonesia, Bangladesh, Finland, and Belgium have a higher well-being rank than their income rank. For many countries, these findings are quite robust to using different data sources; for others, including some OECD countries, the international comparisons are substantially affected by the choice of data set. At the same time, we find that consideration of inequality has a comparatively minor impact on **intertemporal comparisons** of well-being as in most countries of the world income distribution has remained fairly stable over the period of time considered here (esp. when compared to the much larger fluctuations in income growth, see also Lundberg and Squire, 1999). Only in

[1] There are other indicators, such as the Human Development Index and related measures, that have attempted to generate alternatives to this exclusive reliance on income, but they have been criticized for their choice of indicators, aggregation rules, and their neglect of distribution of the achievements considered (see Srinivasan, 1994; Ravallion, 1997).

a few countries (including nearly all transition countries, Britain, and the US) does the consideration of inequality markedly change assessments of changes in well-being. Finally, we find that due to the extremely large global income inequality, **global well-being** is very much lower than it would be if incomes were more equally distributed. For the sample of countries that we consider in our assessment of global income inequality (which unfortunately excludes many of the poorest countries), changes in global well-being are larger than suggested by the income growth measure as inequality seems to have declined in our sample of countries, especially in the 1980s.

It should be pointed out at the start that this paper presents tentative results of an exercise that, to some degree, is still speculative. On the theoretical side, we do not wish to propose definitive measures of well-being. Instead, we merely wish to illustrate how reasonable ways of incorporating inequality in an assessment of well-being will change our impression of well-being across space and time. On the empirical front, our conclusions should be seen as equally tentative. While we have many more data on income inequality across space and time than we used to, the accuracy and comparability of many of them remains a huge problem (see Atkinson and Brandolini, 2001; Deininger and Squire, 1996). We have undertaken some sensitivity analyses using possibly better data available for some points in time in a limited number of countries and using regression-based adjustments. None of this can substitute for long consistent time series of internationally standardized and comparable data which are at present not available. Moreover, our international comparisons of inequality are limited to a small number of countries in the early years we consider (1960, 1970) so that it is difficult to say much about temporal trends in inequality and well-being in many countries. And even for these countries we often only have very irregular data points on inequality so that we cannot really talk about consistent time series. Finally, our 'global' analysis is restricted to some 80 per cent of the world's population, and the 20 per cent excluded are clearly not a random sample. To achieve such good coverage and include the most populous African countries as well, we had, in addition, to make somewhat heroic assumptions as we only have reasonable data for some 76 per cent of the world's population in 1998. Despite these short-comings, we are nevertheless confident that this analysis generates a number of important and usable findings that should be fairly robust to most of the many data problems we encounter.

The paper is organized as follows: the next section discusses the theoretical issues involved in comparing well-being across space and time. Section 3 introduces the measures of well-being we use in the paper. Section 4 discusses the data and our manipulations for this analysis. Section 5 presents the results for the international analysis, section 6 the sensitivity analysis. The results of the intertemporal comparisons are shown in section 7 and section 8 presents our global analysis. Section 9 concludes.

2 The Theory of Well-Being and Real-Income Comparisons

Despite a long history, the theory of welfare judgements across space and time continues to be beset with conceptual and practical problems. Ever since it became evident that social choice theory was not yielding acceptable[2] procedures for making social welfare judgements, such judgements have been based on axiomatic approaches to welfare measurement. Those are based on a conceptualization of what constitutes welfare and then the derivation of an indicator that, under certain stated assumptions, can adequately measure the chosen concept.

Applying such measures to welfare comparisons across space and time generate additional problems. Those are discussed in detail in Sen (1982, 1984) and will only be summarized here. In particular, the theory of welfare comparisons is based on situational comparisons, i.e. whether a person would hypothetically prefer situation A to B. This comparison thus takes place at the same time and is done by the same person. *Intertemporal* or *international* welfare comparisons, however, address different questions. Intertemporal comparisons have to contend with the problem that the persons are not evaluating the welfare of two situations simultaneously, but sequentially. This may generate problems if overall perceptions of welfare or tastes have changed over time (in addition to the problem that not all the people are alive in both periods). Comparisons across space, as done in inter-country comparisons, are even more difficult as now the persons differ whose welfare is being compared.[3] The comparison could be made using the price (or other welfare weight) vectors of either country, which would not necessarily generate the same result. In addition to this theoretical problem, the comparability of prices also throws up another problem, namely the appropriate exchange rate for international comparisons. In the past, most real income comparisons were based on official exchange rates despite the knowledge that they are often distorted as a result of speculation and currency restrictions, and that they imply a systematic underevaluation of the non-traded sector in poorer countries. In recent years, the International Comparison Programme (ICP)[4] has generated purchasing power parity estimates of GDP and GNP based on international prices that try to address these particular short-comings.[5]

Thus there are some important conceptual questions that relate to such comparisons. Only if one places restrictions on intertemporal changes and international differences in

[2]Acceptable is meant in the sense of obeying minimal requirements such as the four conditions stated by Arrow in his famous impossibility result (Arrow, 1963). See also Sen (1973, 1999) for a discussion.

[3]One could try to translate an international comparison into a situational comparison, i.e. asking the British whether they would prefer to live in Britain this year or in France this year. This throws up considerable problems, however, as it is not clear which British person should compare themselves to which French person, or whose welfare function should be used. For a discussion of those issues, see Sen (1982, 1984).

[4]The ICP produces estimates of the economies' main aggregates which are comparable across countries. Purchasing power parities are generated and used for converting the data into a common currency (UN, 1992).

[5]While the data generated by these methods are widely used, they are not beyond question. In particular, the resulting adjusted per capita incomes are sensitive to the choice of 'international prices' which is closer to the prices prevailing in rich countries (Berry, Bourguignon, and Morrison, 1991; Hill, 2000). Moreover, as section 5 reveals, PPP adjustments can differ in their outcomes as the differences between the World Bank estimates and the Penn World Tables demonstrate.

preferences, these comparisons can yield meaningful outcomes. Given the ubiquity of such comparisons, it appears that most analysts are willing to make such assumptions.

The most commonly used indicator for welfare comparisons across space and time is real per capita income.[6] It can be derived from utilitarian welfare economics using three alternative sets of assumptions. One set would demand everyone to have identical unchanging cardinal utility functions where income (or consumption)[7] enters the utility function linearly (e.g. in the simplest form, every unit of consumption generates one unit of utility). An alternative set of assumptions could allow for more realistic concave utility functions, but would still require identical utility functions and require in addition that everyone is earning the per capita income and thus consumes the mean commodity bundle (Sen, 1984). A third set is based on Samuelson (1947) and takes an 'individualistic approach' to welfare measurement. Under this approach, we recover social welfare from individual welfare based on revealed preferences using the Pareto principle. If preferences are complete, convex, and monotonically increasing, if each person's welfare only depends on her purchases (i.e. no externalities and public goods), if there are no market imperfections on the buyer's side, and if each person is rational in the sense that her choices reflect her welfare ranking, then the ratio of market prices should equal the ratio of intra-personal weights (marginal rates of substitution) attached to these goods. These assumptions are not sufficient, however, to ensure that the market prices say anything about the valuation of a good going to two different people, as this requires interpersonal comparisons. To be able to make such interpersonal comparisons which is required for all real income comparisons, we need to assume in addition that the income distribution is 'optimal' in the sense that the ethical worth of each person's marginal dollar is equal (Samuelson, 1947).

All three sets of assumptions are problematic. While many aspects of the various approaches appear unrealistic, the need to *explicitly* ignore the distribution of income in a welfare comparison is particularly unpalatable. Ignoring income distribution through the assumption of linear utility functions, through the assumption of everyone having the same income, or through the assumption of income distribution being 'optimal' from a welfare point of view is all equally debatable. In fact, both theoretical considerations (e.g. declining marginal utility of income derived from convex preferences) as well as empirical observations (e.g. about risk aversion and insurance) clearly suggest that neither utility functions are linear in income or consumption, nor that the existing distribution of incomes is 'optimal' from a social welfare point of view. Instead, these theoretical and empirical considerations point to concave utility functions, i.e. that inequality reduces aggregate welfare as the marginal utility of income among the poor is much higher than among the rich.[8]

Non-utilitarian views of welfare would also suggest that income inequality reduces aggregate well-being. For example, Sen's capabilitity approach (Sen, 1987) which calls for a maximization of people's capability to function (e.g. the capability to be healthy, well-nourished, adequately housed, etc.) also exhibits declining marginal returns in the income

[6]There are well-known omissions and distortions of GNP as a measure of the value created in an economy. These issues will not be discussed further here.

[7]We abstract from the difficulties associated with the treatment of saving in an indicator of welfare. For a discussion, see the paper by Osberg and Sharpe (2000).

[8]This is inherent also in the approach by Graaf (1957) and Sen (1982) who treat the same good going to two different people as two different goods and thus explicitly do away with the distinction between size and distribution of income as the 'welfare depends on them both' (Sen, 1982).

space.[9] Similarly, application of Rawlsian principles would also suggest that welfare is higher in societies where inequality is lower (Rawls, 1971).[10]

One approach to improve upon the welfare content of real income comparisons is therefore to jettison this neglect of income distribution and incorporate the notion of declining marginal welfare returns of income. Each of the measures proposed in the next section does precisely this in slightly different ways.

Before turning to this issue, however, it may be useful to consider one explicit objection to the incorporation of distributional issues in an assessment of well-being. In particular, it may be argued that redistribution reduces the long-term growth potential of an economy because higher inequality will lead to higher growth rates. This would suggest, that there is a trade-off between higher well-being associated with today's lower inequality and lower well-being associated with the subsequently reduced economic growth. While such dynamic considerations go beyond the scope of this analysis and would, in any case, require the inclusion of other dynamic issues (e.g. the role of savings and of depreciation of human, natural, and physical capital in long-term well-being of nations)[11], there is a growing consensus that this trade-off between distribution and growth does not exist. In fact, if anything, the debate has recently shifted in the opposite direction suggesting that initial inequality lowers subsequent growth prospects rather than increases them (e.g. Deininger and Squire, 1998; Alesina and Rodrick, 1994; Clarke, 1995; Persson and Tabellini, 1994; Klasen, 1999). While these findings are still tentative and subject to some debate[12], they suggest that the older claim, that high inequality is necessary for growth, does not seem to be born out by the facts (see also Klasen, 1994).

3 The Well-Being Measures Used

In this section we describe some measures that jointly consider per capita income and its distribution and therefore avoid the particularly problematic neglect of income distribution in a consideration of welfare. Most are well-known in the inequality literature although not all of them have been used explicitly for aggregate welfare comparisons. All share the feature that they can be summarized by the following formula:

$$W = \mu(1 - I) \text{ where: } 0 \leq I \leq 1$$

[9] For example, there appears to be a concave relationship between income and life expectancy, and income and educational achievement. For a discussion, see Klasen (1994).

[10] In the lexicographic version of the maximin principle, only the position of the worst off is relevant; if one generalizes a bit, one would get a more continuous declining marginal valuation of income. Similarly, Hirsch's views on the social limits to growth also imply declining aggregate well-being as a result of inequality. For details see Hirsch (1977) and Klasen (1994).

[11] One might also want to consider longevity in conjunction with income and income inequality to measure how long people are able to enjoy their incomes. For a discussion, see Berry, Bourguignon, and Morrison (1991).

[12] See, for example, Lundberg and Squire (1999) who regard growth and income inequality as jointly determined rather than one causing the other; they also find that inequality is particularly bad for income growth among the poor, while it has a different effect for income growth among the rich.

Welfare W is a function of mean income μ, reduced by a measure of inequality I. Thus, the existing degree of inequality adjusts mean income downward to reflect the welfare loss associated with the (unequal) distribution of that mean income. We will consider several measures because there are on the one hand differences with respect to the intensity of 'welfare penalty' that is imposed. On the other hand the measures vary in the way they penalize different types of inequality.

The first measure considered here was proposed by Sen (1982) and incorporates inequality by using the Gini coefficient G:

$$S = \mu(1 - G)$$

The Sen measure can be derived by replacing Samuelson's problematic 'optimal distribution' assumption by the assumption of 'rank order weighting' (Sen, 1973). Individual incomes will be weighted according to their rank in the income distribution (with the richest person receiving rank 1 and thus the lowest weight for her income). It can also be derived from a utility function where individuals consider not only their own income, but the entire income distribution, with particular emphasis on the number of people with incomes below or above one's own (Dagum, 1990). Thus preferences are assumed to be interdependent which accords well with recent empirical findings (e.g. Easterlin, 1995; Banerjee, 1997).

A variant of this measure was proposed by Dagum (1990):

$$D = \frac{\mu(1 - G)}{1 + G} = \mu(1 - \frac{2G}{1 + G})$$

Clearly, the Dagum measure is a more extreme version of the Sen measure as it results in a higher penalty because of the denominator which imposes an additional punishment for inequality. The Dagum measure is also based on interdependent preferences and implies that people receive a further welfare penalty from the people ahead of them in the income distribution which also appears to be a reasonable assumption.[13]

In addition, we consider two versions of the Atkinson welfare measure. The Atkinson measure was developed as an indicator of inequality that explicitly considers the welfare loss associated with inequality in the measure (Atkinson, 1970). But one can equally well just use the way the welfare loss is calculated, the *equally distributed equivalent income*, as the welfare measure itself.[14] This equally distributed equivalent income is the amount of income that, if distributed equally, would yield the same welfare as the actual mean income and its present (unequal) distribution (Deaton, 1997). The general form of this measure is:[15]

[13] See Dagum (1990) for a derivation and justification of this measure.

[14] This has been done, for example, for Britain by Jenkins (1997) and also by UNDP in deriving the gender-related development index (UNDP, 1995). For a discussion of this index, see Bardhan and Klasen (1999).

[15] This measure also satisfies the general form of the well-being measure $W = \mu(1-I)$ where $I = \frac{1 - A}{\mu}$. See Atkinson (1970) for discussion.

$$A2 = \left[\frac{1}{N} \sum_{i=1}^{N} x_i^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$$

This measure depends crucially on the exponent ε, the *aversion to inequality factor*. The higher ε, the higher the penalty for inequality. We explicitly consider two cases, $\varepsilon = 2$, denoted as $A2$, and $\varepsilon = 1$ ($A1$). In the latter case, the general form of the Atkinson measure is not defined and changes to:

$$ln(A1) = \frac{1}{N} \sum_{i=1}^{N} ln(x_i)$$

The Atkinson measures can be derived from social welfare functions that are additively separable functions of individual incomes. Thus they are based on individualistic utility functions where people only care about their own incomes. Inequality reduces welfare in this formulation as the utility functions considered are concave for all $\varepsilon > 0$. All the measures exhibit constant relative risk aversion. The $\varepsilon = 1$ has the additional property of being based on a constant elasticity utility function, suggesting that a percentage increase in income is valued the same regardless of its recipient. Such an assumption has quite a lot of intuitive appeal. While clearly $\varepsilon = 2$ penalizes inequality more than $\varepsilon = 1$ and is thus based on declining elasticity of income, the underlying assumption, that at twice the level of income, a percentage increase in income is valued half as much as at the lower level of income, also appears to be within the range of reasonable presumptions (see Deaton, 1997; UNDP, 1995). Such penalties of inequality are still consistent with findings from the micro literature on utility and risk. Most of the non-utilitarian theories suggested above would, in fact, likely require considerably higher inequality aversion.[16] While the Atkinson measures are typically based on individual incomes, our N refers to income quintiles only.

A third set of measures were proposed by Ahluwalia and Chenery (1974) which presented measures that combine income growth with redistribution. In particular, they suggested a measure which they called a population-weighted or equal-weighted growth rate which is simply the arithmetic average of the growth rates of each individual (or quintile). Instead of treating a dollar increase the same regardless of its recipient, this measure treats a percentage increase the same, thus also allowing for declining marginal utility of income and exhibiting what they called the 'one person, one vote' principle of growth measurement. It turns out that this measure is a small-number approximation of the Atkinson $\varepsilon = 1$ measure, which also weights a percentage increase the same regardless of its recipient.[17] Thus we will not report it separately here. But the similarity between this measure and the Atkinson measure gives another quite nice justification for the Atkinson measure.

[16] A strict interpretation of Rawls lexicographic maximin principle would require ε to be infinite (see also Atkinson, 1970).

[17] It can be shown that the growth in the Atkinson measure with $\varepsilon = 1$ is simply the geometric mean of the growth rates of individuals (or quintiles, depending on the unit of disaggregation), while the population or equal weights measure is the arithmetic mean of the growth rates. For small numbers, one is an approximation of the other. See Klasen (1994) for a discussion and application of the Ahluwalia and Chenery measures.

Similarly, their second growth measure, the welfare or poverty-weighted growth rate (which gives greater weight to income increases of the poor than the rich) is a discrete approximation of a version of the Atkinson with $\varepsilon > 1$. The Atkinson measure with $\varepsilon = 2$ measure will therefore yield very similar results.

Before turning to the data and the results, it is important to briefly discuss the most important differences between the measures.[18] Apart from the penalty applied to inequality, the two Gini-based measures differ quite fundamentally from the two Atkinson measures (and thus the Ahluwalia and Chenery measures) in ways that are important to consider. First, the two sets of measures respond differently to equal-sized income transfers at different points in the income distribution. While all measures are consistent with the Dalton principle of transfers, the Atkinson measures obey what has been called 'transfer sensitivity', which means that an equal sized transfer will have a larger impact on inequality (and thus on welfare) if it happens among the poorer sections of the income distribution than if it happens among richer sections (Sen, 1997).[19] Most would agree that this is a desirable property. In contrast, the largest impact of an equal-sized transfer using the Gini coefficient will be among the mode of the income distribution, i.e. among middle income groups as these transfers will have the largest impact on the rank of the people affected by the transfer and thus the weights attached to their incomes (see Atkinson, 1970; Blackorby and Donaldson, 1978). While there is some justification for this (if income comparisons with others are very important, clearly shifts in income which have a large impact on the ranking should be weighed heavily), most analysts see this as a rather undesirably property of the Gini-based measures (e.g. Atkinson, 1970). Second, the Atkinson measures are sub-group consistent and thus imply that any increase in the income of a subgroup (or a reduction in inequality of that subgroup) will, ceteris paribus, raise aggregate welfare. In contrast, an increase of income accruing to the richest could actually lower aggregate welfare in the Gini-based measures as the increase in mean income can be more than off-set by the increase in inequality.[20] Some see this as an argument in favor of the Gini-based measures (e.g. Sen, 1997; Dagum, 1990), others see subgroup consistency as a valuable property. For our purposes it will suffice to note that the Gini-based measures penalize inequality more if middle income groups are hurt the most, while the Atkinson measure will penalize more if the poorest are hurt the most by it. Which measure is ultimately a better indicator of welfare is left for the reader to decide.

We will use these measures in different ways. First, we will simply see how much the incorporation of inequality reduces our impression of aggregate well-being. We will therefore present data on how much well-being is reduced in a country at a point in time by the amount of inequality that is present. This can be achieved by simply presenting the ratio of inequality-adjusted income to per capita income. Second, we will examine to what extent the incorporation of inequality changes the ranking of countries. These applications will be used across countries as well as in an intertemporal analysis, where we will look at the years 1960, 1970, 1980, 1990, and 1998. Furthermore, we will study to what extent the inclusion of inequality in the well-being measure will affect our impression

[18] For a more extensive discussion of these issues, refer to Atkinson (1970), Blackorby and Donaldson (1978), and Dagum (1990).

[19] The Dalton principle of transfers says that the value of an inequality measure must fall by a transfer from a richer person to a poorer person which does not reverse their position in the income ranking.

[20] See Dagum (1990) for examples. This difference only appears if inequality is much more extreme than the types of inequality existing in today's world.

of changes in well-being in selected countries. Finally, the global analysis concentrates on the years 1970, 1980, 1990, and 1998 and tries to answer the question, how global welfare changed during this period.

4 The Data

For both components of the measures, data on mean income and inequality, there are several options. Our main source for data on inequality is the World Income Inequality Database version 1.0 (WIID, 2000), which provides more than 5.000 Gini coefficients and associated distributions for 151 countries. The main sources used for assembling the data set were Deininger-Squire data (Deininger and Squire, 1996), Luxembourg Income Study (LIS, 2000), TransMonee Project (TransMonee, 1999) as well as other research studies and information provided by various Central Statistical Offices. To get recent data for developing countries we also make use of Gini coefficients and income shares provided by the World Bank's Poverty Monitor (WB, 2002). In WIID all observations are classified as either 'reliable' or 'less reliable'. We only use observations which are categorized as 'reliable' and represent the entire population of a country.[21] With respect to the income concept used we concentrate on gross or net income, or on expenditures. Regarding the unit of income recipient we consider data based on person (or household per capita), or households. Only for few countries we have to rely on data that either have been adjusted for household composition using an equivalence scale or where the income concept used and the reference unit are unknown.[22] In case, several Gini coefficients with associated distributions were available for a particular country at a particular point in time, those observations were preferably chosen which allowed to have inequality data based on the same or similar specification across time.

Ideally, one would want to at least ensure that the indicators used are based on a consistent definition of income and reference unit both across countries and time.[23] Pursuing this strategy would result in only a small number of countries and not allow a meaningful international analysis. While in the main analysis we therefore have to contend with differing income concepts and reference units, in the sensitivity analysis, we try to generate consistent data by making suitable adjustments to base all data on unequivalized gross income per person.

Although WIID is probably the most comprehensive source on data on inequality, data for the early years in our analysis are rare and we had to make some adjustments. In case there is no Gini coefficient and associated income shares for the particular point in time, we used the nearest available data for our calculations. Despite these adjustments our samples of countries for which we can calculate all measures are still quite limited. Table 1 shows the different years of available data on income distribution we have chosen

[21] Interestingly, it happens that data classified as 'not accepted' in the Deininger-Squire data set, since they are based on either no consistent source (cs) or unknown primary source (ps), are part of the 'reliable data set' in WIID. The opposite, that data belonging to the quality data set in Deininger-Squire data but are categorised as 'not reliable' in WIID, is also possible.

[22] For a discussion of the use of equivalence scales, please refer to Atkinson, Rainwater, and Smeeding (1995), Deaton (1997), and Ayala, Martinez, and Ruiz-Huerta (2001).

[23] Even if Gini coefficients are based on the same definition of income and economic unit they might not be comparable across countries, because of differences in sample methods, quality of surveys etc. (see WIID, 2000).

for the years 1960-1998. The greatest concessions we had to make are for less developed countries like Pakistan, Panama and Chile in 1960, or for Nepal, Indonesia and Singapore in 1970. But also for developed countries like Finland in 1960 and 1970, or Belgium and Italy in 1970 major amendments have been necessary. For 1998, we use the latest available income distribution estimate which in a few cases date as far back as 1990 or 1991, but in most cases comes from the period 1993 to 1997.[24]

Regarding income data one could concentrate on per capita income, per capita disposable income, or per capita consumption. To make our analysis comparable to international comparisons of per capita income and to get the largest possible sample, we rely on per capita gross national product as presented in the national accounts as the income concept used.[25] For the calculation of the well-being measures we make use of purchasing power adjusted income data provided by the Penn World Table (PWT), versions 6.0 and 5.6 (Heston, Summers, and Aten, 2001; Summers and Heston, 1991).[26] In addition, we present data on GNP per capita based on official exchange rates from the World Bank for all years as well as the World Bank's purchasing power adjusted income data for the years 1980, 1990, and 1998 (WDI, 1999, 2001, 2002) for comparison.[27]

In our sensitivity analyses, we replace the data used with alternative estimates which either differ in the definition of income and/or reference unit or were provided by another data source. Moreover, we estimate fixed effects panel regressions to try to address the inconsistent treatment of the reference unit and the income concept, using similar procedures as used by Dollar and Kraay (2000) and Lundberg and Squire (1999). Using the regression-based adjustments, all observations are based on gross income per person.[28]

For calculation of global well-being and changes thereof between 1970 and 1998, we start by using a sub sample which consists of 72 countries that represent 81 per cent percent of the world population in 1998. In order to reach such coverage and include some of the populous and high population growth African and Middle Eastern countries, we had to assume in some cases that income inequality remained stable throughout the period studied and only income growth changed, as we have more data on the latter than the former.[29] However, our main analysis disregards many of the formerly socialist countries since the PWT do not allow to calculate PPP adjusted per capita income for this group of

[24]In nearly all cases, we use the exact year for the income estimate under the (implicit) assumption that changes in income distribution between adjacent years are typically smaller than changes in mean income. Given positive average real income growth present in almost all countries which would bias income comparisons from different years, this assumption appears reasonable.

[25]Gross national product should better capture welfare of the population than gross domestic product as the former includes earnings from abroad and excludes earnings by foreigners.

[26]The PWT 6.0 series we deal with is real per capita GDP, chain method (1996 prices) which is turned to GNP per capita using a series that relates current GNP to GDP. This series is only included in version 5.6 and covers the period 1970-1992 for most countries. For the years 1960 and 1998 we adopt numbers reported for the most adjacent years. Since for the vast majority of countries, GNP and GDP are of similar magnitude and country specific ratios of both income measures are relatively constant over time, these manipulations should not cause major problems.

[27]The World Bank data have been converted to 1996 prices using the US GDP deflator (WDI, 2002), since 1996 is the base year used in the PWT 6.0.

[28]We have refined the regressions to take note of criticisms made by Atkinson and Brandolini (2001) regarding such regression-based adjustments. In particular, we take account of the possibility that the difference between gross and net income may be larger in OECD countries.

[29]This way, we included all countries shown in Table 1 with at least two observations on inequality between 1970 and 1998, except for Bulgaria (no income data in 1970 and 1980 available) and Sierra Leone (civil war in the early 1990's probably disrupted (economic) life seriously). The assumption of stability of

countries. Since many of them experienced a considerable worsening in income inequality during the transition period (Milanovic, 1998; Gruen and Klasen, 2001), ignoring them in a global analysis of well-being may yield flawed results. Therefore, we expand our sample by 15 eastern European countries and successor states of the Soviet Union, covering now 86 per cent of the world population, and make a second analysis of global well-being for the years 1988 and 1988 by using GNI per capita in PPP terms provided by WDI (2002). For both samples we calculated average income per quintile for each country, sorted them in ascending order to generate global income quintiles, and then calculated average incomes of these world quintiles based on the population-weighted country quintiles contained in each world quintile.[30] We thus arrive at average income per 'world quintile' which we applied to the Atkinson measure with $\varepsilon = 1$ and $\varepsilon = 2$.

5 International Analysis

Table 2 presents the analysis for 1960 based on the six measures used. The first two measures are per capita income, using exchange rates and PPP, respectively. The next two are the Atkinson measure with $\varepsilon = 1$ and the Sen measure, exhibiting a comparatively 'mild' well-being penalty for inequality. The last two are the Atkinson ($\varepsilon = 2$) and the Dagum measures with a more heavy implied well-being penalty for inequality. The analysis is restricted to only 43 countries. Since they cover a wide spectrum of incomes, big changes in ranks can only happen when there are very drastic differences between the measures.

Well-being, as estimated by our measures, falls drastically when considering inequality. Using the Atkinson ($\varepsilon = 1$) or Sen measure, well-being falls by about 10-65 per cent, and by 70 (Brazil and Mexico) to nearly 80 per cent (Gabon) in the Atkinson ($\varepsilon = 2$) and Dagum measure. Existing inequality thus leads to fairly major reduction in measured well-being in all the countries considered.

As expected from the discussion of inequality measures above, there are some differences in the extent of 'penalty' for inequality, depending on the measure used. This is to be expected as the Gini-based measures give more emphasis to inequality in the middle income groups, while the Atkinson measure places more weight on inequality among the poorest groups. For example, Pakistan gets penalized less by the Atkinson ($\varepsilon = 2$) measure than the Sen measure, while the reverse is the case for the Philippines. The reason is that in the Philippines the poorest do particularly badly and thus get a heavy penalty in the Atkinson measure, while in Pakistan the middle income groups do relatively worse, which attracts the higher penalty in the Gini-based measure.

In 1960, no assessment of inequality can dislodge the US from the highest rank in all measures, and nothing can prevent Tanzania from being at the bottom of the list for all indicators. Nevertheless, there are a range of interesting changes. First, there is a considerable difference between the ranks using exchange rate and PPP, suggesting the presence

income distribution is, especially when compared to huge variations and changes in income growth levels, reasonable as will be shown below and as has been found by others (e.g. Deininger and Squire, 1998; Lundberg and Squire, 1999). Of the world's 40 most populous countries in 1998, we include all except Russia, Germany, Vietnam, Iran, Ukraine, Democratic Republic of Congo, Myanmar, Argentina, Sudan, Afghanistan, and Uzbekistan.

[30] When a country quintile straddles the line between two world quintiles, we allocated the country quintile proportionately to ensure that the world quintiles contain equal population numbers.

of over- and undervalued exchange rates. As expected, the discrepancy is larger among poorer countries, related to the undervaluation of the non-traded sectors. Second, there are a number of interesting rank reversals when inequality is progressively being considered. For example, Bangladesh and Madagascar trade places between the pure income and the broader well-being measures. In the two income measures Madagascar is four ranks ahead; in the last two columns, Bangladesh is five ranks ahead.[31] A similar reversal occurs, somewhat surprisingly, between Britain and Sweden. Sweden is ahead in the pure income measures, while Britain is ahead in measures that also consider distribution; in fact, it mostly occupies the second highest spot in this list. This suggests that the very low inequality in Sweden was not already present in the 1960s, and the rise of Britain reminds us that Britain was among the more equal countries in Europe in 1960.[32]

Table 3 shows our rankings for 48 countries in 1970. Again there are large differences between exchange rate based estimates of real incomes and PPP estimates, with the discrepancy being largest among poorer countries. Considering inequality continues to reduce well-being drastically. Once again, Brazil is one of the countries that lose most: Well-being using the Dagum measure is 73 per cent below the level it would be if its per capita income were equally distributed. The US remains on top in all measures except the exchange rate adjusted income per capita measure, arguably the least reliable indicator of well-being. At the bottom Nepal, Indonesia, and Sierra Leone vie for the worst spot. Some more dramatic reversals in rank occur. Panama falls from number 25 in the exchange rate list to number 41 in Atkinson ($\varepsilon = 2$) measure. Conversely, Sri Lanka rises from 16 ranks below in the first column to one rank above Panama once inequality is considered in the Atkinson ($\varepsilon = 2$) measure. Unequal Brazil trades places with more equal Korea, and now Sweden maintains its rank when inequality is being considered, while Britain's fall in the income rank cannot be completely compensated by its still comparatively low inequality.

Table 4 examines 57 countries for 1980. We now have one more indicator, PPP adjusted income per capita from the World Bank (WDI, 2002), which we place alongside our data from the Penn World Tables.[33] The comparison suggests that the PPP adjustment is subject to some margin of error. For example, China, India, Pakistan, Bangladesh, Indonesia, Malaysia, Thailand look a lot richer in the PPP adjustment from the Penn World Tables than in the adjustment done by the World Bank while the reverse appears to be the case for many Latin American countries.[34] Several rank changes happen as a result of these differences in the PPP adjustments.

The inequality-adjusted measures continue to be much lower than the income measure suggesting that inequality continues to have a big impact on well-being. Brazil and

[31] Colombia is another country that also falls considerably, once PPP and inequality is considered.

[32] Gottschalk and Smeeding (2000) also report fairly high income inequality in Sweden in the 1960s. In the LIS, Sweden is found to be considerably more equal than Britain. Since the LIS does not go back that far, it is hard to tell whether the reported higher inequality in the 1960s is due to measurement error or true effects. See also sensitivity analysis and Atkinson and Brandolini (2001).

[33] The series used is GNI per capita, PPP in current international dollars. Gross national income is the "sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income [...] from abroad" (WDI, 2002). To be comparable to the data from the Penn World Tables we deflated this series to 1996 prices using the US GDP deflator (WDI, 2002).

[34] Compared to earlier versions of the paper, the differences between the measures are of smaller magnitude in general, since the PPP adjusted incomes provided by the Penn World Tables 6.0 are now based on the ICP's benchmark study of 1996. The World Bank's PPP adjustments are grounded on the 1993 benchmark comparison.

Colombia continue to suffer from the largest reductions in well-being which are also now larger than previously, suggesting not only high but worsening inequality. Due to rising inequality and catch-up growth, the US loses its top spot to Belgium in the Atkinson ($\varepsilon = 2$) measure.[35] Britain still rises in the ranks when inequality is considered. Unequal Brazil and more equal Costa Rica now trade places; Brazil is two ranks ahead in PWT PPP income (column 3), and Costa Rica is one to three places ahead in the inequality-adjusted measures. Bangladesh, on the other hand, no longer improves its position as much as before.[36]

Table 5 examines the per capita income and well-being in 70 countries in 1990. The differences between the PWT and the World Bank PPP adjustments remain considerable, but consistent in the sense that the differences in assessment in 1990 are largely the same as for 1980. Well-being continues to be much lower than before; by and large, the reduction appears to be similar to previous decades suggesting no general worsening (or improvement) in income distribution.

Regarding rank reversals, Brazil and South Africa, two of the world's most unequal countries, get surpassed in the Atkinson measure ($\varepsilon = 2$) by Indonesia, a country 25 and 30 ranks, respectively, below in the income ranking with less than half the PPP income per capita when compared to Brazil. That is to say, Brazil could generate the same level of well-being with only half the income, if that income was as evenly distributed as it is Indonesia.

Low levels of income and sizeable income inequality assure that many African countries land at the bottom end in all measures. At the other end of the spectrum, the US only retains the second spot in the PPP-adjusted income measures and the mildly penalizing inequality adjusted measures. In the Dagum measure it is surpassed by Canada and Luxembourg and, in the Atkinson ($\varepsilon = 2$) measure, additionally by Belgium and the Netherlands. This fall in ranks of the US is mostly due to rising inequality there, compared to the other countries (rather than differences in average income growth). Clearly, people in the US are paying a price in terms of well-being due to the higher inequality there and other countries do not suffer from the same problem (see Klasen (1994) and also below).[37] Also in Britain, higher inequality ensures that Britain no longer rises in ranks and even falls in some measures once inequality is considered (see below).

Table 6 shows the well-being measures for 71 countries in 1998. At the bottom end, we again find mostly African countries. Indonesia still improves in ranks and is ahead of Peru in the Dagum and Atkinson ($\varepsilon = 2$) measures. Similarly, poorer Bulgaria and richer Mexico trade places in two measures which also consider inequality. At the top end, the US again leads the pack, with the exception of the first ranking where official exchanged rates are used, since they experienced a substantial increase in income per capita and a

[35]The US loses especially in the Atkinson ($\varepsilon = 2$) measure as the poorest are particularly badly off in the US. See also Gottschalk and Smeeding (2000).

[36]This is due to somewhat higher observed inequality in 1980, which falls again in the late 1980s and early 1990s. To what extent this data point is an aberration, is difficult to tell.

[37]Please note that these results differ from Ayala, Martinez, and Ruiz-Huerta (2001) which, based on micro data, find that the US is surpassed only by Belgium in the Atkinson ($\varepsilon = 2$) measure, while Canada and Sweden remain considerably worse off. The difference in findings is probably mainly due to the use of the mean (gross) income variable based on national accounts used here, while in Ayala, Martinez, and Ruiz-Huerta (2001) mean income refers to disposable income based on adjusted micro data. Other sources of differences could be the different PPP adjustments used (PWT versus OECD PPP adjustments), and differences in the Gini coefficients.

comparatively small change in income inequality compared with 1990.[38] Rising inequality in Canada is ensuring that it is falling further behind, being surpassed by seven other OECD countries in the Atkinson ($\varepsilon = 2$) measure.

It is hard to summarize the many particular findings from this discussion. But a few points are worth noting. First, real income comparisons based on official exchange rates give a very misleading impression of well-being. In particular, they systematically understate well-being in developing countries. At the same time, there are discrepancies between the two sets of available PPP estimates. Second, consideration of inequality has a large impact on well-being. Well-being falls by 15-75 per cent once we consider inequality. The comparison of welfare levels between Indonesia and Brazil in Figure 1 is informative here. Relying on unadjusted income measures, Brazil is far ahead of Indonesia in all years, but once inequality is considered as well, Brazil's welfare levels drop sharply and in 1998 Indonesia has not only closed the gap but, according to the newly introduced Atkinson measure with $\varepsilon = 5$ reached a slightly higher welfare level than Brazil. Third, large differences in inequality between countries lead to very large changes in rank. Brazil's drop in rank is a very dramatic illustration of this. Fourth, changes in inequality have an important impact in some countries, most notably the US and Britain. This is nicely illustrated in Figure 2 which examines the welfare levels for the US and Canada between 1970 and 1990. While the slopes of the curves for the US become steeper when going from 1970 to 1990 thereby indicating rising inequality which leads to lower welfare levels, Canada experiences declining inequality and is thus able, according to some measures, to reach a higher welfare level than the US in 1990.[39] Fifth, the combination of income growth as well as levels and changes in inequality together can lead to very large differences in changes in well-being. The comparison between Sri Lanka and Peru is instructive here (see Figure 3). Sri Lanka combines comparatively low inequality with steady growth, Peru experienced considerable fluctuations in its mean income with relatively high inequality. In 1998, despite being still poorer in income than Peru, Sri Lanka has already a higher welfare level in the Atkinson ($\varepsilon = 2$) measure and adds to this lead if $\varepsilon = 5$ is assumed.

To assess whether these findings are due to peculiarities and inconsistencies of the data chosen, we present a sensitivity analysis in the following.

6 Sensitivity Analysis

The robustness of our results is verified with the help of two different approaches. Firstly, we simply replace the data on income distribution used in the original analysis. For those countries we have alternative data available which are either based on different income concepts and/or reference units or come from other data sources, we replace Gini coefficients and income shares, calculate the measures, rank the countries again and compare the results with those obtained from the first analysis.[40]

[38] This statement seems to be justified, even although the data on income distribution used in 1998 originally stems from 1991, since this is also the case for other OECD countries like Canada, Great Britain, Italy, Netherlands, and Norway.

[39] Interestingly, Canada, despite its smaller income, also regularly surpasses the US in the Human Development Index calculated by the United Nations Development Programme UNDP (2002).

[40] We restrict this replacing to alternative data which are based on the same year (plus/minus one year) as was used in the main analysis.

Table 7 shows the Gini coefficients and their alternatives, what income concepts and recipient units they are based upon as well as the resulting changes in rankings. The simultaneous replacement approach leads mainly to no or only small changes in ranking. However, in some cases major changes take place. The alternative Gini coefficient used for Jamaica in 1960 exceeds the one originally used by only 1.7 percentage points, which leads to only little changes in ranking when focussing on the Gini based measures. However, the income shares (which are not reported here) partly change considerably, leaving the poorest 20 per cent with only half the income and increasing the share of income going to the richest 20 per cent of population by almost 50 per cent. The Atkinson measures answer these dramatic changes with notably lower ranks.

Turning to the year 1980, Canada and Norway experienced significant changes in ranking. For both countries the alternative Gini coefficients were taken from LIS (2000) and are based on the same specifications as the ones used in the original analysis. However, the Gini coefficients itself differ considerably, thereby leading to changes up to 8 ranks. Data on inequality provided by the Luxembourg Income Study are derived from micro data sets and undergo different strategies of top and bottom coding - both may contribute to the existing differences.

Mexico in 1990 is another example of the bandwidth of inequality data available for one particular point in time. Both Gini coefficients were provided by Deininger and Squire (1996) but belong to different quality classifications. The main difference between the two indices is the income share going to the richest 20 per cent of population, which amounts to 59.3 per cent in the first distribution but is declining to 53.6 per cent in the one used alternatively. Consequently, distribution of income is more equal according to the alternative data and especially the measures that penalize the existing degree of inequality more rank Mexico up to 6 positions higher.

In a second kind of sensitivity analysis, we use a regression-based approach to deal with the inconsistencies in terms of the income concepts and reference units used. We expand our sample by adding data of countries not considered in the main analysis but which are part of the reliable set in WIID (2000). This enables us to get several observations per country at the same time which should improve our ability to identify the reference unit and income definition effects. In particular, we regress the Gini coefficients available on the income definition (expenditure, net income, unknown income, or gross income, the excluded category), and the reference unit considered (household, family, unknown, equivalized, or person, the excluded category). Following suggestions from Atkinson and Brandolini (2001), we include dummy variables for Deininger-Squire data labelled as 'cs' (no consistent source) and 'ps' (primary source unknown).

Regression 1 in Table 8 shows that indeed the income definition and the choice of reference unit do matter. Expenditure-based and net-income or equivalized Gini coefficients are typically lower, while household-based Gini coefficients appear to be higher.[41] The interaction term net income and OECD countries in the second regression shows that the difference between gross and net income is largely a phenomenon of OECD countries, as one would expect (Atkinson and Brandolini, 2001).

[41]The somewhat surprising result about household-based Gini coefficients was also found by Lundberg and Squire (1999). Note that the regressions here have considerably higher explanatory power (as measured by the R-squared) as the ones used by Dollar and Kraay (2000) and Lundberg and Squire (1999).

We then adjust the Gini coefficients based on the regression results from the first estimation and thereby base all these adjusted Gini coefficients on the omitted categories, i.e. gross income per person. This way we should have dealt with the most glaring inconsistencies, although further adjustments are surely possible (Atkinson and Brandolini, 2001).

How do the results change if one uses these adjusted Gini coefficients for the calculation of the Gini based measures? Table 9 shows that generally the results do not change greatly. Using the Sen measure, the vast majority of rankings remain the same or change only by one position. Regarding the Dagum measure, more significant variations happen, but again there is more persistence than change. In 1998, the year when most changes occur due to the adjusted Gini coefficients, less than 15 per cent of rank changes were by more than one position. Moreover, most of the dramatic rank reversals and changes discussed earlier still hold.[42]

These sensitivity analyses suggest that few of the basic results on the large absolute impact of inequality and the change in ranks as a result of it reported are meaningfully affected by using different data sets. However, quite a number of individual rankings are affected so that analyses that focus on these smaller differences, particularly among OECD countries, should use more consistent data sources rather than rely on the rather heterogeneous information (Ayala, Martinez, and Ruiz-Huerta, 2001).

7 Comparisons Across Time

The discussion in section 5 has already suggested that in some countries inequality has changed considerably. At the same time, it appears that there is also a great deal of stability in inequality measures which has also been found by Deininger and Squire (1998) and Lundberg and Squire (1999). Most countries either seem to improve or worsen in rank at a point in time when inequality is considered, with this relationship not changing much over time. In this section we examine this question a bit more closely.

A first impression can be gleaned from Table 10 which shows average Gini coefficients from the 1960s to the 1990s. What emerges is a great deal of stability. The average Gini, whether raw or adjusted based on regression 1 in Table 8, does not appear to have changed a lot (see also Deininger and Squire, 1998; Lundberg and Squire, 1999).[43] This average could, however, mask some variation. Therefore we specify fixed and random effects regressions to examine this question closer. First, we want to see whether, controlling for country-specific fixed and random effects, there are temporal trends in inequality. In Table 11 specifications (1) and (2) show the results from the fixed and random effects regressions.[44] While the general impression of great stability is supported, results suggest that, when compared to the 1990s, inequality was significantly higher in the 1960s,

[42]For example, while Brazil and Indonesia still move towards similar welfare levels once inequality is considered in the measurement, Brazil remains more ranks ahead in the inequality adjusted welfare measures. This is mostly due to the fact that the Indonesian data are based on expenditures while the Brazil data are based on gross incomes. Similarly, Britain rises less in the early years considered and it falls more in the later years once the adjusted Gini is used, since an equivalence scale was applied to the originally used data.

[43]The small observed changes could be due to compositional changes.

[44]The Hausman test suggests that random effects would be preferable to use, although the results do not differ much.

and significantly lower in the 1980s, but the average differences were not very large in magnitude.[45]

The last two specifications are fixed effects regressions testing for an intertemporal Kuznets curve, i.e. the suggestion that as countries go through the process of development, inequality first worsens and then improves again. The results are quite clear here. There is not even the smallest hint for such an inverse U relationship that would hold systematically across all countries (see also Deininger and Squire, 1998; Lundberg and Squire, 1999). In fact, specification (4) rather suggests the opposite, namely a U shaped relationship, even though it is not a very distinct curve. Thus, on average, there do not seem to be systematic trends in income distribution that relate either to temporal trends or to trends in income. It does not appear that inequality within countries is rising or falling systematically. For our study of well-being, this is a significant finding since it basically tells us that assessments of *changes* in well-being will not change very much for most countries if we switch from an income growth rate to a measure that growth rates in the distribution-sensitive measures.

Figures 4 and 5 plot two typical examples. While Brazil and Indonesia differ greatly with respect to the degree of existing inequality, the income distributions itself did not vary a lot in the last decades. This results in comparatively small differences between an income growth rate and the growth rate of our distribution-adjusted income measures (illustrated by similar height of the first columns of each measure). At the same time, this general stability masks some apparent rises and declines in inequality in those countries. For example, in Brazil inequality appears to have become notably more unequal between 1961 and 1990, which in the sub-period 1981-1989 was accompanied by only moderate income growth leading not only to smaller, but negative growth rates in the inequality adjusted welfare measures, while since 1990 this trend has been reversed. Thus one should not interpret longer-term stability as the absence of any developments in sub-periods (see also Atkinson and Brandolini, 2001). Canada and Finland are two other examples where changes in inequality differed in different time periods (Figures 6 and 7). Finland is particularly notable for the fact that inequality appears to have declined considerably since the 1980s leading to higher changes in well-being once inequality is considered. Finally, the case of China (Figure 8) illustrates that considerable income growth is not automatically associated with a worsening income distribution, although higher inequality in the 1990s let the inequality adjusted growth rates become smaller.

It thus appears that the processes that led to increases in inequality in some rich countries (notably the US and Britain) are not global processes or even processes that affect all industrialized countries the same.[46] Despite some rhetoric to the contrary, all rich countries do not appear to be condemned by global forces or other processes to face ever-rising inequality. Although a careful investigation of this issue goes beyond the scope of this paper, the differences in experience suggest that the role of economic policy in generating and combating income inequality is quite considerable (see also Atkinson, 1997; Aghion and Williamson, 1998).

Despite this general rule, there are some notable exceptions and it is important to emphasize that in some countries assessment of income growth seriously bias our view of

[45]These results are robust to using the adjusted Gini coefficients.

[46]Based on the LIS, Gottschalk and Smeeding (2000) find that in the majority of OECD countries, there was some increase in inequality in the 1980s. The timing and the extent differed greatly, however, and it was far from being a universal phenomenon. See also Ayala, Martinez, and Ruiz-Huerta (2001).

changes in well-being. In particular, we will study Britain and the US.[47] The impact of inequality on changes in well-being in the US was already studied in Klasen (1994). Here the analysis is extended to 2000 and some other measures are considered in addition. Figure 9 shows the basic results. During the 1950s and the 1960s, high annual growth was accompanied by falling inequality which ensures that increases in well-being were considerably above the income growth rate. In contrast, in the 1970s, 1980s, and 1990s, low to moderate income growth was accompanied by sharply rising inequality so that well-being grew by negligible amounts. In fact, it shrank in the 1980s, depending on the measure.[48]

Since economic growth has picked up since 1993 and unemployment is/was at a 30 years low, one may wonder how well-being changed in the so-called 'new economy.' Figure 10 gives an impression. Income growth since 1993 has been still somewhat below the high growth rates of the 1960s, and inequality continues to worsen (although at a much slower pace) in the 1990s. This time, it is more due to greater income increases among the rich, rather than deteriorations among the poor which was the case in the 1980s. This rising inequality means that well-being in the 'New Economy' is growing considerably more slowly than in the much-maligned 1960s where high growth was accompanied by falling inequality.

The story for Britain looks much the same (Figure 11). Based on the inequality series produced by the Institute of Fiscal Studies (IFS), in the 1960s and the 1970s, moderate income growth was accompanied by falling inequality thus leading to sharper increases in well-being. In the 1980s, moderate income growth translated into stagnation of well-being once the sharply rising inequality is accounted for (see also Atkinson, 1997).

8 Global Well-Being and Inequality

As is well-known, global inequality is more of a result of inequality between nations than inequality within nations (Anand, 1993; Berry, Bourguignon, and Morrison, 1991; Milanovic, 2002). The richest 20 per cent of the world consume some 70-80 per cent of world income (depending on the calculation and the countries included), leaving some 2-3 per cent to the poorest 20 per cent, which is far larger than the discrepancy between the rich and poor in any one country (UNDP, 1999; Milanovic, 2002). As a result, we would expect that consideration of this inequality between nations should have a considerable impact on our measures of well-being. Figure 12, based on 'our world' which captures some 81 per cent of the population in 1998 but leaves out quite a few of the poorest as well as many transition countries, shows that it does indeed. Using the Atkinson measures, we find that world well-being is less than half if we use $\varepsilon = 1$ and only about a quarter if we use $\varepsilon = 2$ for all years considered. This is to say that 'our world' would be as well off as it is currently if it only had half or a quarter its income and distributed that evenly.

[47] Many formerly socialist countries experienced sharp increases in inequality during the period of transition which was also accompanied by negative income growth. In Kyrgyz Republic and Ukraine this resulted in dramatic welfare losses up to 75 per cent for the period 1988-1995 according to Atkinson ($\varepsilon = 2$) and Dagum measures. See also Gruen and Klasen (2001).

[48] Also here, one can nicely see the difference between the Gini-based measures and the Atkinson measures. The poorest did particularly badly in the 1980s and the Atkinson measure with $\varepsilon = 2$ shows a deterioration in well-being.

Including the missing poor countries would lead to even more dramatic reductions in well-being. Global inequality is not just a political, economic, and social problem, it is a welfare problem as it reduces aggregate global well-being considerably.

Figures 12 and 13 also show that global inequality in our restricted world does not seem to have increased a great deal over the last 30 years. While it was relatively stable between 1970 and 1980, it decreased quite remarkably since then. The growth of the Atkinson measures far surpasses the growth in mean global income, particularly in the 1980s. This is mostly due to high and fairly evenly spread per capita growth in China and India, as well as high growth in other dynamic Asian economies which push up income growth of the poorest three quintiles of the world income distribution, as Figure 12 shows (see also Schultz, 1998).

Income growth and changing distribution could also result in a considerable degree of income mobility. Table 12 illustrates how many country quintiles fall into the particular global quintiles and what changes took place between 1970 and 1998. According to the admittedly rather crude measure, there seems to be a great deal of stability, since 203 out of the 360 country quintiles belong to the same world quintile in both years.[49] Furthermore, this stability is very much concentrated at the lower and upper tail of the world income distribution, which was already found by Quah (1993). In case of the richest global quintile this finding can be attributed to many OECD economies, which, except for their poorest country quintiles, already succeeded in 1970 to belong entirely to this income group. Turning to the bottom end, most African countries considered in this analysis could not drop out of the lowest spots in the global income distribution.[50] Among the population that managed to move upwards and reached the highest income category in 1998 are the second to fourth quintiles of Korea as well as the poorest three quintiles of Singapore. Similar upward mobility can be observed for Indonesia, China, Sri Lanka, Malaysia, and Thailand, while many African countries like Tanzania, Ethiopia, Uganda, Nigeria, Kenya as well as Bangladesh, Colombia, and Guatemala exhibit downward mobility. In 1998, their country quintiles are found among lower global quintiles than in 1970.

By looking at the results obtained from our expanded sample which considers 15 transition countries in addition, it becomes clear, that the assessment of global inequality and well-being is to some extent driven by sample size, the period considered, and the choice of income data. In this second global analysis, we use PPP adjusted income data provided by the World Bank (WDI, 2002). As is evident from Tables 4-6, the World Bank's calculation assumes that incomes in some of the poorer countries are somewhat lower than in the Penn World Tables, which will lead to higher global inequality. In 1998, global welfare level is of similar magnitude for both samples, with the discrepancy being larger among poorer quintiles. Turning to changes in well-being during the last decade, the two samples tell different stories. As shown in Figure 14, the first four global quintiles of the larger sample still realized positive income growth between 1988 and 1998, but at considerably lower rates. The richest world quintile, however, experienced negative income growth. This somewhat surprising result is largely caused by dramatic income losses that many of the socialist countries had to deal with during the transition period. In 1988, the richest country quintiles of 16 transition countries fall into the fifth world quintile; out of them eight still belong to it in 1998, despite having realized considerably income losses.

[49] In fact, income mobility is much higher, since there is a lot variability within each world quintile.

[50] The increasing number of country quintiles falling into the poorest world quintile is mainly due to the fact, that the second poorest quintile of China could climb into the next income category.

These losses cannot be balanced out by positive income growth in other countries, and the average income for the richest 20 per cent of the world's population considered here is declining. On the other hand, although both the inclusion of transition countries and the use of the World Bank's income data lead to higher inequality at a global level, the trend of declining inequality since the 1980s is not affected, as the growth rates of the Atkinson measures exceed the growth of mean income.

Thus, in line with some other studies (e.g. Schultz, 1998) but in contrast to findings from studies by UNDP (1999) and Milanovic (2002), there has not been a uniform rise in global inequality, nor has there been no mobility of countries up and down the world income distribution.[51] Including even more of the poorest countries would, however, somewhat temper this assessment as they are likely to have contributed to increasing global inequality and less mobility.

Clearly, global inequality is associated with major reductions in well-being. In fact, the reductions are larger than similar reductions within countries since inter-country inequality is so much larger than intra-country inequality. At the same time, high growth in China and India, where most of the world's poor live, and considerably mobility suggest that we are not necessarily facing a world of rising and ever more rigid global distribution.

9 Summary and Conclusion

From a theoretical point of view, the inclusion of income inequality in a measure of well-being is well justified. Here, we tried to demonstrate, what impact the various measures have when applied to a rich set of data. Summarizing the multi-faceted results, it firstly can be said that the consideration of the distribution on income affects our assessment of *absolute well-being* at a country and, even more so, at a global level. Secondly, it frequently alters the ranking of countries drastically. Regarding comparisons across time we found that in some countries the impression of *changes in well-being* differs when level and changes of inequality are taken into account. Thus, we conclude that it seems worth exploring the linkages between growth, inequality, and well-being further.

The global analysis showed, that the last decades have seen periods, where global inequality was rising and falling, where countries moved upwards and downwards the world income distribution, suggesting that there is scope for economic policy to influence within-country inequality which then also affect global inequality.

Being aware that much of the data we applied were not intended to be used in such examinations, we tried to verify our results. We found that although data on inequality are still not sufficiently consistent neither across time nor across countries, many of the main findings are relatively robust. The late 1990s have seen the evolution of the World Income Inequality Database which provides easy access to indexes and distributions as well as quality ratings thereby enabling us to make a careful choice. Despite these already immense improvements, future developments should be directed at generating consistent and internationally comparable time series on inequality.

[51] Milanovic (2002) uses micro data to generate estimates for global inequality in 1988 and 1993. He finds sharply rising global inequality. The difference between his and our finding is probably due to the choice of time period, the large representation of transition economies in his data set, and the use of mean income figure that is based on micro data and may bear little resemblance with national accounts data used here.

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Table 1: **The Matching of Income and Inequality Data, 1960-1998**

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Australia	AUS	-	1969 (32.0)	1981 (40.0)	1989 (37.3)	1990 (41.7)
Burundi	BDI	-	-	-	-	1992 (33.3)
Belgium	BEL	-	1979 (28.3)	1985 (26.2)	1988 (26.6)	1992 (26.9)
Burkina Faso	BFA	-	-	-	-	1994 (48.2)
Bangladesh	BGD	1963 (37.3)	1973 (36.0)	1981 (39.0)	1989 (28.9)	1996 (33.6)
Bulgaria	BGR	-	-	-	1990 (24.5)	1997 (27.3)
Bahamas	BHS	-	-	-	-	1993 (45.3)
Bolivia	BOL	-	1968 (53.0)	-	1990 (42.0)	-
Brazil	BRA	1960 (53.0)	1970 (57.6)	1980 (57.8)	1989 (59.6)	1997 (51.7)[a]
Barbados	BRB	-	-	1979 (48.9)	-	-
Botswana	BWA	-	-	1986 (54.2)	-	-
Central African Republic	CAF	-	-	-	-	1993 (61.3)
Canada	CAN	1965 (31.6)	1971 (32.2)	1981 (31.8)	1990 (27.6)	1991 (35.1)
Chile	CHL	1968 (45.6)	1971 (46.0)	-	1990 (56.1)[a]	1994 (54.8)[a]
China	CHN	-	-	1980 (32.0)	1990 (34.6)	1997 (39.8)[a]
Cote d'Ivoire	CIV	1959 (43.0)	-	1985 (41.2)	1988 (36.9)	1995 (36.7)
Colombia	COL	1964 (62.0)	1970 (52.0)	1978 (54.5)	1991 (51.3)	-
Costa Rica	CRI	1961 (50.0)	1971 (44.4)	1981 (47.5)	1989 (46.1)	-
Benin	BEN	1959 (42.0)	-	-	-	-
Denmark	DNK	1963 (37.0)	1976 (31.0)	1981 (31.0)	1987 (33.1)	1995 (37.4)
Dominican Republic	DOM	-	-	1984 (43.3)	1989 (50.5)	-
Algeria	DZA	-	-	-	1988 (38.7)	1995 (35.3)
Ecuador	ECU	-	1968 (38.0)	-	1988 (43.9)[a]	1995 (43.7)
Egypt	EGY	-	-	-	1991 (32.0)	1995 (28.9)
Spain	ESP	1965 (32.0)	1973 (37.1)	1980 (34.2)	1989 (25.9)	1991 (33.0)
Ethiopia	ETH	-	-	1981 (32.4)[a]	-	1995 (40.0)
Finland	FIN	1966 (31.8)	1977 (30.5)	1980 (30.9)	1987 (26.1)	1997 (23.6)
Fiji	FJI	-	1968 (46.0)	-	-	-
France	FRA	1962 (50.0)	1970 (39.8)	1979 (34.9)	-	-
Gabon	GAB	1960 (64.0)	1975 (59.3)	1977 (63.2)	-	-
United Kingdom	GBR	1961 (25.3)	1970 (25.1)	1980 (24.9)	1990 (32.3)	1991 (32.4)
Ghana	GHA	-	-	-	1989 (36.7)	1997 (32.7)

continued on next page

Table 1: *continued*

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Guinea	GIN	-	-	-	1991 (46.8)	1994 (40.3)
Guinea-Bissau	GNB	-	-	-	-	1991 (56.2)
The Gambia	GMB	-	-	-	-	1992 (47.8)
Greece	GRC	1957 (38.0)	1974 (35.1)	1981 (33.3)	1988 (35.2)	-
Guatemala	GTM	-	-	1979 (49.7)	1989 (59.1)	-
Guyana	GUY	1956 (56.2)	-	-	-	1993 (40.2)
Honduras	HND	-	1968 (61.9)	-	1990 (57.4)[a]	1992 (52.6)
Hungary	HUN	-	1972 (22.8)	1982 (21.0)	1991 (23.3)	1998 (25.3)
Indonesia	IDN	-	1976 (34.6)	1980 (35.6)	1990 (33.1)	1995 (34.2)
India	IND	1960 (32.6)	1970 (30.4)	1983 (31.5)	1990 (29.7)	1997 (37.8)
Ireland	IRL	-	1973 (38.7)	1980 (35.7)	1987 (34.6)	-
Italy	ITA	-	1977 (36.3)	1980 (34.3)	1989 (32.7)	1991 (32.2)
Jamaica	JAM	1958 (54.3)	1975 (44.5)	1988 (43.2)	1990 (41.8)	1996 (36.4)
Jordan	JOR	-	-	1980 (40.8)	1991 (40.7)	1997 (36.4)
Japan	JPN	1962 (37.2)	1970 (35.5)	1980 (33.4)	-	-
Kenya	KEN	-	-	-	1992 (54.4)	1994 (44.5)
Republic of Korea	KOR	1965 (34.3)	1970 (33.3)	1980 (38.6)	1988 (33.6)	1993 (31.6)
Laos	LAO	-	-	-	-	1992 (30.4)
Sri Lanka	LKA	1963 (47.0)	1970 (37.7)	1980 (42.0)	1990 (30.1)	1995 (34.4)
Lesotho	LSO	-	-	-	1987 (56.0)	1993 (57.9)[a]
Luxembourg	LUX	-	-	-	1985 (27.1)	-
Morocco	MAR	-	-	1984 (39.2)	1991 (39.2)	1999 (39.5)
Madagascar	MDG	1960 (53.0)	-	1980 (46.9)[a]	-	1993 (43.4)
Mexico	MEX	1963 (53.0)	1968 (57.7)	1984 (50.6)	1989 (55.0)	1992 (50.3)
Mali	MLI	-	-	-	1989 (36.5)[a]	1994 (50.5)
Mongolia	MNG	-	-	-	-	1995 (33.2)
Mozambique	MOZ	-	-	-	-	1997 (39.6)[a]
Mauritania	MRT	-	-	-	1988 (42.5)	1995 (38.9)
Mauritius	MUS	-	-	1980 (45.7)	1986 (39.6)	1991 (36.7)
Malaysia	MYS	-	1970 (50.0)	1979 (51.0)	1989 (48.4)	-
Namibia	NAM	-	-	-	-	1993 (74.3)[a]
Niger	NER	1960 (34.0)	-	-	1992 (36.1)	1995 (50.6)
Nigeria	NGA	1959 (51.0)	-	1986 (37.0)	1992 (41.2)	1997 (50.6)
Nicaragua	NIC	-	-	-	-	1993 (50.3)

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Table 1: *continued*

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Netherlands	NLD	1962 (42.0)	1975 (28.6)	1981 (26.7)	1987 (29.4)	1991 (29.4)
Norway	NOR	1962 (37.5)	1973 (37.5)	1979 (31.2)	1990 (33.3)	1991 (33.3)
Nepal	NPL	-	1977 (53.0)	1984 (30.1)	-	1996 (36.7)
New Zealand	NZL	-	1973 (30.1)	1980 (34.8)	1989 (36.6)	1990 (40.2)
Pakistan	PAK	1969 (30.6)	1970 (29.9)	1979 (32.3)	1988 (31.4)	1997 (31.2)
Panama	PAN	1969 (48.0)	1970 (57.0)	1980 (47.5)	1989 (56.5)	1997 (48.5)
Peru	PER	1961 (61.0)	-	1981 (49.3)	1986 (42.8)	1997 (46.2)[a]
Philippines	PHL	1961 (49.7)	1971 (49.4)	1985 (46.1)	1988 (44.7)	1997 (46.2)
Papua New Guinea	PNG	-	-	-	-	1997 (50.9)
Poland	POL	-	1976 (25.8)	1980 (24.9)	1990 (26.2)	1996 (33.7)
Portugal	PRT	-	1973 (40.6)	1980 (36.8)	1990 (36.8)	1991 (35.6)
Paraguay	PRY	-	-	-	1991 (39.7)[a]	-
Romania	ROM	-	-	-	1989 (23.4)	1994 (28.7)
Rwanda	RWA	-	-	1983 (28.9)	-	-
Senegal	SEN	1960 (56.0)	-	-	1991 (53.8)	1994 (41.3)
Singapore	SGP	-	1978 (37.0)	1980 (40.7)	1988 (41.0)	-
Sierra Leone	SLE	-	1968 (60.8)	-	1989 (62.9)	-
El Salvador	SLV	1965 (53.0)	-	1977 (48.4)	-	-
Sweden	SWE	1967 (37.9)	1975 (31.4)	1980 (29.4)	1990 (29.0)	1992 (31.1)
Chad	TCD	1958 (35.0)	-	-	-	-
Thailand	THA	1962 (41.3)	1969 (42.6)	1981 (43.1)	1990 (48.8)	1998 (41.4)
Trinidad and Tobago	TTO	1958 (46.0)	1971 (51.0)	1981 (41.7)	-	-
Tunisia	TUN	1965 (42.3)	1971 (53.0)	1985 (43.4)[a]	1990 (40.2)	-
Turkey	TUR	1968 (56.0)	1973 (51.0)	-	1987 (44.1)	1994 (41.5)
Tanzania	TZA	1964 (54.0)	-	-	1991 (59.0)	1993 (38.1)
Uganda	UGA	-	-	-	1989 (33.0)	1993 (39.2)
USA	USA	1960 (34.9)	1970 (34.1)	1980 (35.2)	1990 (37.8)	1991 (37.9)
Venezuela	VEN	1962 (42.0)	1971 (47.7)	1981 (42.8)	1989 (44.1)	-
South Africa	ZAF	-	-	-	1993 (62.3)	1994 (59.3)
Zambia	ZMB	1959 (48.0)	-	1976 (51.0)	1991 (48.3)[a]	1996 (49.8)
Zimbabwe	ZWE	-	-	-	1990 (56.8)	-

Notes: Gini coefficients are in parentheses.
[a]: Data taken from the World Bank (WB, 2002).

Table 2: **Welfare Measures 1960**

Rank	GNP/cap* (exchange rate)		GNP/cap** (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
43	TZA	n.a.	TZA	451	TZA	65.5	TZA	46.0	TZA	49.1	TZA	29.9
42	IND	163	PAK	884	NGA	67.0	NGA	49.0	NGA	52.6	NGA	32.5
41	PAK	187	IND	908	PAK	87.8	IND	67.4	MDG	45.8	MDG	30.7
40	NGA	217	NGA	985	IND	86.0	PAK	69.4	IND	75.3	BEN	40.8
39	BGD	222	BGD	1094	BEN	78.6	BEN	58.0	PAK	78.3	IND	50.8
38	LKA	271	BEN	1128	BGD	81.6	MDG	47.0	COL	29.2	PAK	53.1
37	TCD	292	THA	1173	THA	77.4	BGD	62.7	SEN	38.2	THA	41.5
36	BEN	357	TCD	1376	MDG	64.8	THA	58.7	BGD	67.9	BGD	45.7
35	MDG	374	MDG	1437	ZMB	71.8	ZMB	52.0	BEN	66.1	ZMB	35.1
34	NER	413	ZMB	1467	LKA	71.5	LKA	53.0	THA	64.0	LKA	36.1
33	THA	459	CIV	1475	CIV	75.6	CIV	57.0	LKA	52.7	SEN	28.2
32	CIV	601	KOR	1483	SEN	58.3	SEN	44.0	ZMB	57.7	COL	23.5
31	GUY	620	LKA	1496	TCD	84.2	TCD	65.0	CIV	63.6	CIV	39.9
30	ZMB	627	NER	1767	KOR	82.0	COL	38.0	BRA	40.4	GUY	28.1
29	SEN[d]	650	SEN	1929	COL	50.2	KOR	65.7	GAB	27.9	TCD	48.1
28	PHL	715	PHL	2054	PHL	67.2	GUY	43.8	KOR	66.2	PHL	33.6
27	TUN[a]	791	TUN	2155	BRA	61.2	PHL	50.3	PHL	48.4	KOR	48.9
26	COL[b]	1239	GUY	2290	NER	84.3	BRA	47.0	TCD	72.5	BRA	30.7
25	SLV	1328	PAN	2358	TUR	60.2	NER	66.0	TUR	38.9	PER	24.2
24	KOR	1347	BRA	2389	TUN	76.7	JAM	45.7	PER	36.6	GAB	22.0
23	JAM	1395	COL	2461	PAN	70.3	TUR	44.0	GUY	54.6	JAM	29.6
22	TTO	1466	JAM	2578	GAB	48.2	PAN	52.0	PAN	53.6	TUR	28.2
21	PAN	1590	TUR	2717	PER	54.1	PER	39.0	NER	72.3	PAN	35.1
20	MEX	1621	CHL	2755	GUY	74.8	TUN	57.7	TUN	60.7	NER	49.3
19	TUR[d]	1637	PER	3146	JAM	73.9	GAB	36.0	JAM	54.2	TUN	40.5
18	PER	1857	SLV	3400	CHL	71.8	CHL	54.4	CHL	52.9	CHL	37.4
17	BRA	1887	GAB	3473	SLV	64.0	SLV	47.0	SLV	47.9	SLV	30.7
16	GAB	1911	CRI	3593	MEX	62.1	CRI	50.0	MEX	42.0	CRI	33.3
15	CRI	2010	GRC	3837	CRI	69.9	MEX	47.0	TTO	46.8	MEX	30.7
14	CHL	2209	MEX	3963	TTO	69.9	TTO	54.0	CRI	54.1	TTO	37.0
13	GRC	3537	TTO	4143	GRC	80.7	GRC	62.0	FRA	31.6	GRC	44.9
12	VEN[c]	3896	ESP	4330	JPN	79.9	JPN	62.8	GRC	69.5	JPN	45.8

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Table 2: *continued*

Rank	**GNP/cap*** **(exchange rate)**		**GNP/cap**** **(PPP)**		**Atkinson** ($\epsilon = 1$) **(% of GNP/cap, PPP)**		**Sen (% of GNP/cap, PPP)**		**Atkinson** ($\epsilon = 2$) **(% of GNP/cap, PPP)**		**Dagum (% of GNP/cap, PPP)**	
11	ESP	4740	JPN	4431	ESP	88.2	ESP	68.0	JPN	63.9	ESP	51.5
10	JPN	8372	VEN	5512	VEN	73.6	VEN	58.0	VEN	53.7	VEN	40.8
9	GBR	9752	FIN	7425	FRA	59.9	FRA	50.0	ESP	76.1	FRA	33.3
8	FIN	10087	FRA	8072	FIN	86.1	FIN	68.2	NLD	52.1	NLD	40.8
7	FRA	10857	NOR	8225	NLD	73.1	NOR	62.5	SWE	50.0	NOR	45.5
6	NOR	11363	NLD	9124	NOR	82.5	NLD	58.0	NOR	64.0	FIN	51.7
5	CAN	11795	GBR	9668	SWE	75.2	SWE	62.1	FIN	74.5	SWE	45.0
4	NLD	12416	SWE	9973	DNK	79.4	DNK	63.0	DNK	60.8	DNK	46.0
3	USA	13579	DNK	10227	GBR	89.4	CAN	68.4	CAN	72.8	CAN	52.0
2	SWE	13600	CAN	10244	CAN	85.7	GBR	74.7	GBR	80.4	GBR	59.6
1	DNK	15458	USA	12911	USA	79.7	USA	65.1	USA	60.6	USA	48.3

Notes: All rankings are based on the absolute values of the well-being indicator.
The last four columns present the ratios of the respective adjusted income to unadjusted GNP per capita, PPP.
*: GNP per capita, constant 1996 US-Dollars (WDI, 1999, 2001).
**: Real GNP per capita, 1996 prices (Summers and Heston, 1991; Heston, Summers, and Aten, 2001).
[a]: Income data of Tunisia (TUN) from 1961.
[b]: Income data of Colombia (COL) from 1965.
[c]: Income data of Venezuela (VEN) from 1967.
[d]: Income data of Senegal (SEN) and Turkey (TUR) from 1968.
n.a.: Income data not available.

Table 3: **Welfare Measures 1970**

Rank	**GNP/cap (exchange rate)**		**GNP/cap (PPP)**		**Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)**		**Sen (% of GNP/cap, PPP)**		**Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)**		**Dagum (% of GNP/cap, PPP)**	
48	POL	n.a.	NPL	864	NPL	66.6	NPL	47.0	SLE	27.6	NPL	30.7
47	NPL	160	IDN	879	IDN	84.5	IDN	65.4	NPL	49.5	SLE	24.4
46	IND	215	IND	1110	SLE	50.5	SLE	39.2	HND	24.8	IDN	48.6
45	BGD	261	BGD	1174	HND	48.9	HND	38.1	IDN	72.9	HND	23.5
44	SLE	281	PAK	1323	BGD	82.1	BGD	64.0	BGD	68.6	BGD	47.1
43	PAK	285	SLE	1522	IND	87.7	IND	69.6	IND	77.9	IND	53.4
42	IDN	306	LKA	1617	PAK	88.2	PAK	70.1	PAK	78.9	PAK	54.0
41	LKA	332	HND	1913	LKA	81.3	LKA	62.3	PAN	27.7	LKA	45.2
40	HND	577	THA	2012	THA	75.0	THA	57.4	LKA	67.6	TUN	30.7
39	THA	776	PHL	2451	TUN	60.8	TUN	47.0	PHL	46.1	BOL	30.7
38	BOL	845	ECU	2490	PHL	67.2	BOL	47.0	BOL	43.5	THA	40.2
37	PHL	846	TUN	2609	BOL	63.0	PHL	50.6	THA	57.8	PHL	33.9
36	ECU	906	BOL	2619	MYS	66.7	MYS	50.0	TUN	44.6	MYS	33.3
35	TUN	980	KOR	2664	ECU	80.1	COL	48.0	MYS	47.2	BRA	26.9
34	MYS	1384	MYS	2711	PAN	52.9	BRA	42.4	BRA	38.9	COL	31.6
33	COL	1415	COL	3138	BRA	59.1	ECU	62.0	FJI	48.6	PAN	27.4
32	FJI	1685	FJI	3192	COL	68.9	PAN	43.0	ECU	64.9	ECU	44.9
31	TUR	1703	CHL	3506	FJI	68.9	FJI	54.0	TUR	44.7	FJI	37.0
30	JAM	1911	JAM	3568	KOR	84.4	KOR	66.7	TTO	28.5	TUR	32.5
29	TTO	2029	BRA	3638	TUR	65.5	TUR	49.0	COL	55.2	CHL	37.0
28	KOR	2214	TUR	3706	CHL	70.7	CHL	54.0	CHL	51.4	KOR	50.0
27	MEX	2309	PAN	3899	JAM	71.3	JAM	55.5	JAM	51.0	JAM	38.4
26	CRI	2417	POL	4056	MEX	55.7	MEX	42.3	MEX	34.7	MEX	26.8
25	PAN	2437	CRI	4365	CRI	74.4	CRI	55.6	KOR	71.9	CRI	38.5
24	BRA	2600	HUN	5431	TTO	55.8	TTO	49.0	CRI	57.7	TTO	32.5
23	CHL	2670	MEX	5493	POL	90.7	POL	74.2	GAB	40.6	GAB	25.6
22	HUN	2703	TTO	5968	GAB	59.2	GAB	40.7	POL	82.4	POL	59.0
21	GAB	3446	PRT	5979	PRT	78.3	PRT	59.4	VEN	47.9	PRT	42.3
20	VEN	4196	SGP	6004	HUN	92.1	SGP	63.0	PRT	62.2	VEN	35.5
19	PRT	5166	IRL	7209	SGP	83.4	VEN	52.4	SGP	70.3	SGP	46.0
18	SGP	5589	VEN	7318	VEN	69.5	HUN	77.2	IRL	59.6	IRL	44.2
17	GRC	6984	GRC	7618	IRL	78.7	IRL	61.3	HUN	84.7	HUN	62.9

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Table 3: *continued*

Rank	**GNP/cap (exchange rate)**		**GNP/cap (PPP)**		**Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)**		**Sen (% of GNP/cap, PPP)**		**Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)**		**Dagum (% of GNP/cap, PPP)**	
16	IRL	8483	GAB	7805	GRC	82.6	GRC	64.9	GRC	68.0	GRC	48.0
15	ESP	8677	ESP	8201	ESP	82.4	ESP	62.9	ESP	67.0	ESP	45.9
14	ITA	11064	JPN	11107	JPN	75.5	NOR	62.5	FRA	48.7	NOR	45.5
13	GBR	12151	NOR	11294	NOR	77.2	JPN	64.5	JPN	56.2	JPN	47.6
12	CAN	12522	FIN	11404	FRA	71.2	ITA	63.7	NOR	58.7	ITA	46.7
11	NZL	12648	ITA	11433	ITA	83.7	FRA	60.2	ITA	70.5	FRA	43.1
10	AUS	13698	GBR	12063	FIN	85.3	FIN	69.6	FIN	71.7	FIN	53.3
9	FIN	15389	FRA	12730	GBR	90.0	GBR	74.9	NZL	72.8	CAN	51.2
8	NOR	15840	BEL	12740	BEL	88.3	BEL	71.8	CAN	70.6	NZL	53.8
7	BEL	16714	NZL	13165	NZL	86.2	NZL	70.0	BEL	77.3	BEL	55.9
6	FRA	16774	NLD	13302	CAN	84.7	CAN	67.8	GBR	81.8	GBR	59.9
5	USA	17443	CAN	13816	NLD	88.5	NLD	71.4	SWE	69.0	AUS	51.5
4	NLD	17890	AUS	14273	AUS	85.5	AUS	68.0	AUS	72.6	NLD	55.5
3	SWE	19874	SWE	14491	SWE	84.5	SWE	68.6	NLD	78.4	SWE	52.2
2	JPN	20370	DNK	14574	DNK	85.4	DNK	69.0	DNK	72.2	DNK	52.7
1	DNK	22190	USA	17134	USA	81.5	USA	65.9	USA	64.6	USA	49.2

For definition of columns, see notes in Table 2.

Table 4: **Welfare Measures 1980**

Rank	GNP/cap (exchange rate)		GNI/cap* (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
57	ETH	119	POL	n.a.	ETH	705	ETH	86,5	ETH	67,6	ETH	76,1	ETH	51,0
56	NPL	154	COL	n.a.	NPL	934	NPL	88,0	BGD	61,0	ZMB	45,2	ZMB	32,5
55	CHN	170	ETH	721	BGD	1046	BGD	80,5	NPL	69,9	BGD	66,3	BGD	43,9
54	BGD	227	CHN	809	NGA	1059	NGA	82,7	NGA	63,0	MDG	54,5	MDG	36,2
53	IND	234	NPL	862	RWA	1078	ZMB	65,4	ZMB	49,0	NPL	78,5	NGA	46,0
52	NGA	253	BGD	985	CHN	1095	MDG	72,1	MDG	53,2	NGA	69,6	NPL	53,8
51	PAK	325	NGA	1020	IND	1225	CHN	87,3	CHN	68,0	CHN	75,8	CHN	51,5
50	RWA	328	ZMB	1143	MDG	1292	RWA	88,9	RWA	71,1	RWA	80,3	RWA	55,2
49	MDG	345	IND	1178	ZMB	1369	IND	86,9	IND	68,5	IND	76,6	IND	52,1
48	LKA	439	MDG	1178	PAK	1409	PAK	86,4	PAK	67,7	PAK	76,0	PAK	51,1
47	IDN	493	PAK	1178	IDN	1640	IDN	84,0	IDN	64,4	IDN	71,4	IDN	47,5
46	ZMB	553	RWA	1266	LKA	2059	LKA	89,1	LKA	58,0	BWA	43,1	LKA	40,8
45	CIV	1004	IDN	1460	CIV	2677	THA	71,8	BWA	45,8	THA	52,4	BWA	29,7
44	MAR	1111	LKA	1864	THA	2875	CIV	77,4	CIV	58,8	LKA	78,6	CIV	41,6
43	THA	1135	CIV	2163	JAM	2967	BWA	63,1	THA	56,9	CIV	61,1	THA	39,8
42	PHL	1187	THA	2568	MAR	3076	JAM	75,8	JAM	56,8	JAM	59,0	JAM	39,7
41	DOM	1309	MAR	2867	BWA	3309	PHL	73,0	PHL	53,9	COL	40,7	PHL	36,9
40	JAM	1482	JAM	3078	DOM	3375	MAR	80,4	MAR	60,8	PHL	56,1	COL	29,4
39	BWA	1515	BWA	3113	PHL	3381	DOM	75,7	DOM	56,7	DOM	58,6	DOM	39,6
38	SLV	1589	DOM	3763	SLV	4058	COL	62,2	COL	45,5	MAR	66,3	MAR	43,7
37	TUN	1613	GTM	3957	GTM	4169	SLV	69,9	SLV	51,6	SLV	52,0	GTM	33,6
36	GTM	1620	MYS	4080	COL	4353	GTM	69,6	GTM	50,3	GTM	51,5	SLV	34,8
35	MUS	1802	SLV	4115	KOR	4519	MYS	66,6	MYS	49,0	MYS	46,2	MYS	32,5
34	JOR	1880	MUS	4133	TUN	4611	PER	67,8	PER	50,7	BRA	36,8	PER	33,9
33	COL	1957	TUN	4133	MYS	4757	TUN	75,6	TUN	56,6	CRI	44,9	BRA	26,8
32	MYS	2312	PHL	4326	PER	4844	KOR	77,8	BRA	42,2	PAN	50,0	PAN	35,6
31	PAN	2459	JOR	4537	JOR	4849	PAN	69,7	PAN	52,5	PER	52,4	TUN	39,4
30	PER	2490	PAN	4801	PAN	5051	JOR	74,7	KOR	61,4	KOR	60,0	CRI	35,6
29	POL	2967	PER	5170	CRI	5451	BRA	58,0	CRI	52,5	TUN	59,2	KOR	44,3
28	CRI	3044	KOR	5293	MUS	6116	CRI	67,8	JOR	59,2	JOR	58,8	JOR	42,0
27	MEX	3245	GAB	6454	BRA	6277	GAB	53,6	MUS	54,3	GAB	33,7	GAB	22,6
26	KOR	3760	CRI	6472	POL	6361	MUS	82,9	GAB	36,8	MEX	47,9	MUS	37,3

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Table 4: *continued*

Rank	GNP/cap (exchange rate)		GNI/cap* (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
25	VEN	4075	BRA	6876	MEX	7717	MEX	67,2	MEX	49,4	MUS	68,4	MEX	32,8
24	HUN	4210	VEN	7105	HUN	7904	POL	91,4	VEN	57,2	TTO	48,6	VEN	40,0
23	BRA	4512	TTO	7562	VEN	7943	VEN	75,2	POL	75,1	VEN	57,3	TTO	41,1
22	GAB	5057	MEX	7738	PRT	8721	TTO	72,4	TTO	58,3	BRB	35,8	POL	60,2
21	TTO	5065	HUN	9497	TTO	8858	PRT	80,4	PRT	63,2	POL	83,6	PRT	46,2
20	BRB	6909	SGP	9971	IRL	9327	IRL	77,8	IRL	64,4	IRL	59,1	BRB	34,4
19	PRT	7343	PRT	10024	GAB	9396	HUN	93,9	HUN	79,0	PRT	63,6	IRL	47,4
18	GRC	10122	IRL	10253	ESP	10512	BRB	63,3	BRB	51,1	HUN	88,4	SGP	42,2
17	SGP	10886	ESP	12152	GRC	11040	ESP	83,5	ESP	65,8	ESP	69,4	ESP	49,0
16	IRL	11068	BRB	12539	SGP	11830	GRC	84,1	SGP	59,3	SGP	64,7	HUN	65,3
15	ESP	11174	GRC	14087	BRB	12827	SGP	79,1	GRC	66,7	GRC	70,4	GRC	50,0
14	NZL	13966	NZL	14966	GBR	14324	NZL	82,4	NZL	65,2	AUS	56,5	NZL	48,4
13	GBR	14503	GBR	15757	NZL	14363	AUS	76,2	AUS	60,0	NZL	66,8	AUS	42,9
12	ITA	14990	FIN	16179	FIN	15240	JPN	83,5	ITA	65,7	NOR	58,7	ITA	48,9
11	AUS	16001	ITA	16777	JPN	15360	FIN	84,5	JPN	66,6	JPN	68,7	JPN	49,9
10	CAN	16280	AUS	17111	ITA	15430	GBR	89,9	FIN	69,1	FIN	70,6	FRA	48,3
9	FIN	20710	JPN	17481	NLD	16300	NOR	78,5	GBR	75,1	FRA	69,8	FIN	52,8
8	USA	21593	SWE	17797	FRA	16588	ITA	86,7	FRA	65,1	ITA	75,3	GBR	60,1
7	NLD	21868	FRA	17956	NOR	16611	FRA	83,5	NOR	68,9	GBR	81,9	NOR	52,5
6	FRA	21968	NLD	18184	AUS	16816	DNK	85,4	DNK	69,0	DNK	71,6	DNK	52,7
5	BEL	22243	NOR	18852	SWE	16858	SWE	86,8	SWE	70,6	SWE	73,7	SWE	54,6
4	SWE	23218	BEL	19380	BEL	16954	NLD	90,1	NLD	73,3	CAN	71,6	NLD	57,9
3	NOR	23228	DNK	19767	DNK	17058	BEL	90,0	CAN	68,2	NLD	81,1	CAN	51,7
2	DNK	26249	CAN	20224	CAN	18280	CAN	85,6	BEL	73,8	USA	62,2	BEL	58,5
1	JPN	28217	USA	22897	USA	21330	USA	80,1	USA	64,8	BEL	80,5	USA	47,9

For definition of columns, see notes in Table 2.

*: Real GNI per capita, 1996 prices (WDI, 2002).

[a]: Income data of Ethiopia (ETH) from 1981.

Table 5: **Welfare Measures 1990**

Rank	GNP/cap (exchange rate)		GNI/cap (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
70	TZA	185	COL	n.a.	TZA	527	TZA	55,7	TZA	41,0	TZA	33,3	TZA	25,8
69	NGA	224	TZA	498	MLI	654	SLE	39,9	MLI	63,5	SLE	15,9	SLE	22,8
68	NER	234	MLI	672	UGA	741	MLI	82,3	SLE	37,1	MLI	69,0	MLI	46,5
67	SLE	246	NGA	800	NER	990	UGA	85,7	UGA	67,0	ZMB	44,3	KEN	29,5
66	UGA	251	NER	835	NGA	1030	ZMB	66,6	KEN	45,6	KEN	40,9	UGA	50,4
65	MLI	256	UGA	846	ZMB	1115	KEN	60,6	ZMB	51,7	UGA	75,1	ZMB	34,9
64	BGD	289	ZMB	893	SLE	1215	NGA	78,7	NGA	58,9	SEN	41,1	NGA	41,7
63	IND	327	SLE	893	KEN	1227	NER	83,2	NER	63,9	NGA	64,4	NER	47,0
62	KEN	345	KEN	1078	GHA	1264	SEN	62,8	SEN	46,2	MRT	49,7	SEN	30,0
61	GHA	352	BGD	1159	BGD	1353	MRT	72,9	MRT	57,5	NER	70,8	MRT	40,3
60	CHN	358	SEN	1345	MRT	1372	GHA	82,2	GHA	63,3	HND	37,0	HND	27,1
59	MRT	420	MRT	1426	SEN	1565	BGD	89,0	HND	42,6	GHA	68,7	GHA	46,3
58	PAK	454	CIV	1530	IND	1738	HND	58,6	BGD	71,2	GIN	42,8	BGD	55,2
57	ZMB	514	GHA	1553	CIV	1751	CIV	81,8	CIV	63,1	BGD	80,3	ZWE	27,5
56	GIN	517	PAK	1576	CHN	1779	CHN	83,8	CHN	65,4	GTM	30,7	CIV	46,1
55	SEN	557	IND	1600	PAK	1966	IND	88,3	IND	70,3	CIV	67,9	GIN	36,2
54	LKA	580	CHN	1623	HND	2136	GIN	67,1	ZWE	43,2	ZWE	42,8	CHN	48,6
53	HND	634	GIN	1669	GIN	2352	PAK	87,0	GIN	53,2	CHN	70,5	GTM	25,7
52	ZWE	676	BOL	2017	BOL	2424	ZWE	61,1	PAK	68,6	IND	78,9	IND	54,2
51	CIV	693	LSO	2098	LKA	2610	BOL	76,4	BOL	58,0	PAN	30,8	DOM	32,9
50	LSO	748	IDN	2156	IDN	2730	GTM	54,2	GTM	40,9	BOL	60,0	BOL	40,8
49	IDN	761	HND	2249	ZWE	2841	DOM	67,7	DOM	49,5	DOM	48,7	PAK	52,2
48	BOL	805	LKA	2307	DOM	3001	LKA	88,0	PHL	55,3	PAK	76,8	PHL	38,2
47	EGY	967	ZWE	2620	EGY	3152	IDN	86,6	LKA	69,9	LSO	37,8	LSO	28,2
46	PHL	1113	EGY	2840	PHL	3159	PHL	75,7	IDN	66,9	ECU	54,6	PAN	27,8
45	MAR	1285	ECU	2944	PER	3447	LSO	59,6	LSO	44,0	BRA	31,8	ECU	39,0
44	DOM	1333	GTM	3211	ECU	3464	ECU	74,0	ECU	56,1	PHL	60,5	IDN	50,3
43	GTM	1359	MAR	3222	JAM	3554	PAN	56,1	PER	57,2	LKA	78,4	PER	40,1
42	ECU	1436	JAM	3327	GTM	3578	PER	76,9	PAN	43,5	ZAF	28,6	LKA	53,7
41	JOR	1465	JOR	3628	MAR	3599	EGY	86,6	JAM	58,2	IDN	76,8	JAM	41,1
40	ROM	1570	PER	3651	JOR	3748	JAM	77,3	EGY	68,0	PER	61,9	COL	32,2
39	DZA	1595	DOM	3721	LSO	4288	MAR	80,4	MAR	60,8	COL	46,6	BRA	25,3

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Table 5: *continued*

Rank	GNP/cap (exchange rate)		GNI/cap (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
38	BGR	1607	PHL	3837	PAN	4612	JOR	78,8	JOR	59,3	JAM	61,7	MAR	43,7
37	JAM	1624	PAN	4265	COL	4619	COL	67,6	COL	48,7	MAR	66,3	JOR	42,2
36	TUN	1797	TUN	4370	CRI	4886	BRA	52,9	BRA	40,4	EGY	76,4	CHL	28,1
35	PER	1882	THA	4393	DZA	4953	THA	67,8	CHL	43,9	JOR	64,3	EGY	51,5
34	PRY	1900	PRY	4648	THA	4998	CRI	71,0	THA	51,2	THA	48,2	ZAF	23,2
33	THA	2013	DZA	5042	TUN	5016	CHL	61,8	CRI	53,9	CHL	42,1	THA	34,4
32	COL	2119	MYS	5262	PRY	5218	ZAF	51,3	ZAF	37,7	CRI	50,5	CRI	36,9
31	PAN	2432	CHL	5436	ROM	5393	TUN	78,5	TUN	59,8	MEX	40,9	MYS	34,8
30	POL	2611	TUR	5668	CHL	5728	DZA	80,4	DZA	61,3	TUN	62,7	MEX	29,0
29	TUR	2673	VEN	5680	POL	5767	PRY	78,6	PRY	60,3	MYS	51,8	TUN	42,6
28	CRI	2982	CRI	5853	TUR	5988	MYS	70,1	MYS	51,7	PRY	62,9	DZA	44,2
27	MUS	2988	BGR	6190	BRA	6004	TUR	74,8	MEX	45,0	DZA	66,7	PRY	43,1
26	MYS	3109	POL	6213	MYS	6099	MEX	61,9	TUR	55,9	TUR	57,7	TUR	38,8
25	MEX	3143	BRA	6271	VEN	6268	VEN	74,0	VEN	55,9	VEN	55,7	VEN	38,8
24	CHL	3237	MUS	6468	BGR	6747	ROM	92,3	ROM	76,6	ROM	85,0	ROM	62,1
23	VEN	3344	MEX	7152	ZAF	7270	POL	90,6	POL	73,8	POL	82,2	POL	58,4
22	ZAF	4026	ROM	7233	MEX	7336	BGR	92,3	BGR	75,5	BGR	85,5	BGR	60,6
21	BRA	4108	ZAF	9215	HUN	9525	MUS	79,4	MUS	60,4	MUS	63,8	MUS	43,2
20	HUN	4740	KOR	10293	MUS	9769	KOR	84,3	KOR	66,4	IRL	57,9	KOR	49,7
19	KOR	8119	HUN	10467	KOR	10013	HUN	92,6	HUN	76,7	KOR	71,9	PRT	46,2
18	PRT	10082	PRT	12878	IRL	11791	IRL	76,6	PRT	63,2	PRT	64,2	IRL	48,6
17	GRC	11265	IRL	13538	GRC	12059	PRT	80,6	IRL	65,4	GRC	67,1	GRC	47,9
16	IRL	14124	GRC	13643	PRT	12157	GRC	82,3	GRC	64,8	HUN	86,2	HUN	62,2
15	ESP	14317	ESP	14848	ESP	13682	NZL	80,8	NZL	63,4	NZL	64,5	NZL	46,4
14	NZL	14442	SGP	15219	NZL	15039	ESP	89,6	ESP	74,1	ESP	79,7	ESP	58,8
13	AUS	18185	NZL	15485	GBR	18091	AUS	80,8	AUS	62,7	AUS	63,8	AUS	45,6
12	ITA	18236	AUS	19044	AUS	18541	GBR	85,4	SGP	59,0	SGP	64,7	SGP	41,8
11	GBR	18253	GBR	19171	ITA	18801	SGP	79,1	GBR	67,7	DNK	64,1	GBR	51,2
10	SGP	18356	ITA	19902	NLD	19132	ITA	87,8	ITA	67,3	GBR	73,7	ITA	50,7
9	CAN	18807	FIN	20064	FIN	19172	SWE	86,3	NLD	70,6	NOR	67,6	NOR	50,0
8	NLD	25737	NLD	20354	SWE	19631	DNK	82,1	NOR	66,7	ITA	77,4	DNK	50,2
7	BEL	26358	SWE	20412	BEL	20190	NOR	82,8	DNK	66,9	SWE	74,3	NLD	54,6

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Table 5: *continued*

Rank	**GNP/cap (exchange rate)**		**GNI/cap (PPP)**		**GNP/cap (PPP)**		**Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)**		**Sen (% of GNP/cap, PPP)**		**Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)**		**Dagum (% of GNP/cap, PPP)**	
6	FIN	26614	DNK	21942	SGP	20459	FIN	89,4	SWE	71,0	FIN	78,4	SWE	55,0
5	USA	26721	NOR	21965	NOR	20649	NLD	91,7	FIN	73,9	USA	57,5	FIN	58,6
4	SWE	26836	BEL	22336	DNK	20757	BEL	89,7	BEL	73,4	NLD	84,3	BEL	57,9
3	NOR	28499	CAN	22486	CAN	21328	CAN	88,4	CAN	72,4	BEL	79,9	USA	45,1
2	DNK	31475	USA	27169	USA	26628	USA	77,0	USA	62,2	CAN	76,6	CAN	56,8
1	LUX	46827	LUX	28861	LUX	38421	LUX	89,5	LUX	72,9	LUX	80,1	LUX	57,3

For definition of columns, see notes in Tables 2 and 4.

[a]: Income data of Bulgaria (BGR) from 1991.

Table 6: **Welfare Measures 1998**

Rank	GNP/cap (exchange rate)		GNI/cap (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
71	ETH	109	TZA	466	TZA	460	TZA	81.0	TZA	61.9	GNB	32.1	GNB	28.0
70	BDI	148	BDI	563	ETH	637	GNB	57.4	GNB	43.8	CAF	28.5	TZA	44.8
69	GNB	164	ETH	573	BDI	684	ETH	80.2	MLI	49.5	TZA	67.3	MLI	32.9
68	MOZ	181	GNB	593	GNB	706	MLI	68.3	ETH	60.0	NER	36.8	CAF	24.0
67	TZA	187	MLI	690	MLI	765	CAF	51.2	CAF	38.7	MLI	50.4	ETH	42.9
66	NER	219	ZMB	690	MDG	821	NER	62.5	ZMB	50.2	ZMB	49.3	ZMB	33.5
65	NPL	227	MOZ	709	ZMB	843	ZMB	68.5	NER	49.4	ETH	67.2	NER	32.8
64	NGA	233	NER	738	NER	891	BDI	85.2	BDI	66.7	NGA	49.8	NGA	32.8
63	MDG	237	MDG	738	NGA	964	MDG	76.2	MDG	56.6	MDG	60.5	MDG	39.4
62	BFA	262	NGA	748	UGA	964	NGA	68.4	NGA	49.4	BDI	73.7	BDI	50.0
61	MLI	272	BFA	874	MOZ	991	BFA	71.3	BFA	51.8	BFA	55.3	BFA	35.0
60	UGA	340	KEN	971	BFA	1052	UGA	80.4	UGA	60.8	GMB	52.0	GMB	35.3
59	CAF	342	CAF	1049	CAF	1052	MOZ	79.8	GMB	52.2	UGA	66.2	UGA	43.7
58	KEN	342	UGA	1059	GMB	1142	GMB	70.8	MOZ	60.4	MOZ	65.5	MOZ	43.3
57	GMB	354	NPL	1205	KEN	1236	KEN	74.4	KEN	55.5	KEN	57.0	KEN	38.4
56	BGD	369	SEN	1302	MNG[a]	1263	MNG	84.7	MRT	61.1	NAM	19.1	MRT	43.9
55	ZMB	373	LAO	1321	MRT	1363	MRT	79.8	MNG	66.8	MRT	64.7	NIC	33.0
54	GHA	402	BGD	1379	GHA	1391	NPL	82.7	NPL	63.3	NIC	49.0	MNG	50.2
53	NIC	421	GMB	1428	NPL	1412	GHA	85.8	NIC	49.7	MNG	72.1	NAM	14.7
52	LAO	428	CIV	1477	LAO[a]	1569	SEN	78.5	SEN	58.7	HND	46.6	NPL	46.3
51	IND	436	MRT	1477	SEN	1578	NIC	68.1	GHA	67.3	NPL	70.5	SEN	41.6
50	MNG	453	MNG	1593	BGD	1653	LAO	88.1	HND	47.4	SEN	64.0	HND	31.0
49	MRT	468	PAK	1681	CIV	1735	HND	66.5	LAO	69.6	GHA	75.0	GHA	50.7
48	PAK	513	GHA	1710	NIC	1832	BGD	85.5	BGD	66.4	CIV	69.0	CIV	46.3
47	SEN	578	GIN	1778	HND	2114	CIV	82.2	CIV	63.3	BGD	75.0	BGD	49.7
46	GIN	600	NIC	1826	PAK	2139	NAM	36.7	NAM	25.7	LAO	79.1	LAO	53.4
45	LSO	692	IND	2021	GUY	2321	GUY	79.2	GUY	59.8	LSO	34.2	PNG	32.5
44	HND	703	PNG	2059	IND	2437	PAK	87.6	PAK	68.8	GUY	64.4	GUY	42.6
43	CHN	726	HND	2273	GIN	2716	IND	82.8	PNG	49.1	PNG	49.7	LSO	26.6
42	CIV	745	LSO	2331	PNG	3029	PNG	67.8	IND	62.2	PAK	78.4	IND	45.1
41	GUY	775	IDN	2574	CHN	3205	GIN	79.0	GIN	59.7	IND	71.3	PAK	52.4
40	LKA	794	ECU	2963	JAM	3357	LSO	56.1	LSO	42.1	GIN	64.4	GIN	42.6

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Table 6: *continued*

Rank	GNP/cap (exchange rate)		GNI/cap (PPP)		GNP/cap (PPP)		Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)		Sen (% of GNP/cap, PPP)		Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)		Dagum (% of GNP/cap, PPP)	
39	IDN	922	LKA	3002	PHL	3393	PHL	72.9	PHL	53.8	PHL	56.2	PHL	36.8
38	PNG	975	EGY	3177	IDN	3393	CHN	78.6	CHN	60.2	CHN	62.7	CHN	43.1
37	EGY	1183	CHN	3206	ECU	3611	ECU	75.0	ECU	56.3	ECU	58.2	ECU	39.1
36	PHL	1206	JAM	3254	EGY	3782	JAM	82.5	JAM	63.6	JAM	69.3	JAM	46.6
35	ROM	1316	MAR	3283	LKA	3812	IDN	84.9	IDN	65.8	PER	52.5	PER	36.8
34	MAR	1378	GUY	3371	LSO	3920	MAR	79.4	MAR	60.5	ZAF	35.3	IDN	49.1
33	BGR	1395	JOR	3643	MAR	3970	PER	71.7	PER	53.8	IDN	73.9	MAR	43.4
32	DZA	1502	PHL	3779	JOR	4146	LKA	84.4	LKA	65.6	MAR	65.1	ZAF	25.5
31	ECU	1584	PER	4303	DZA	4274	EGY	89.1	JOR	63.6	LKA	72.9	LKA	48.8
30	JOR	1644	DZA	4566	NAM	4383	JOR	82.9	EGY	71.1	PAN	46.1	JOR	46.6
29	JAM	1728	BGR	4711	PER	4486	DZA	83.0	DZA	64.7	JOR	70.6	DZA	47.8
28	NAM	2175	PAN	5158	ROM	4742	ZAF	55.5	ZAF	40.7	DZA	69.6	EGY	55.2
27	PER	2339	THA	5479	BGR	4898	ROM	88.7	PAN	51.5	BRA	44.1	PAN	34.7
26	THA	2602	NAM	5741	THA	5766	PAN	67.7	BRA	48.3	EGY	80.5	BRA	31.8
25	PAN	3087	ROM	5935	PAN	6288	BGR	87.4	THA	58.6	THA	63.0	THA	41.4
24	TUR	3329	BRA	6606	BRA	6868	BRA	65.1	ROM	71.3	ROM	78.9	MEX	33.1
23	MEX	3496	TUR	6615	ZAF	7090	THA	77.8	BGR	72.7	MEX	48.3	ROM	55.4
22	POL	3677	MEX	7577	TUR	7226	MEX	67.6	MEX	49.7	BGR	77.5	CHL	29.2
21	ZAF	3910	POL	7713	MEX	7841	TUR	77.5	CHL	45.2	CHL	43.4	BGR	57.1
20	MUS	4001	CHL	8325	POL	8659	CHL	63.0	TUR	58.5	TUR	61.6	TUR	41.3
19	BRA	4545	ZAF	8374	CHL	9305	POL	85.9	POL	66.3	POL	74.9	POL	49.6
18	HUN	4805	MUS	8461	HUN	10919	HUN	91.7	HUN	74.7	BHS	47.6	MUS	46.3
17	CHL	5401	HUN	10074	MUS	12937	MUS	82.1	MUS	63.3	MUS	68.2	BHS	37.7
16	KOR	11084	KOR	13551	KOR	13140	BHS	70.8	BHS	54.7	NZL	57.0	HUN	59.6
15	BHS	12045	BHS	14261	PRT[b]	14448	KOR	86.1	KOR	68.4	HUN	84.2	NZL	42.6
14	PRT	12062	PRT	14843	NZL[b]	15923	PRT	82.7	PRT	64.4	KOR	74.1	KOR	52.0
13	NZL	15585	NZL	16242	BHS[a]	15974	NZL	76.5	NZL	59.8	PRT	67.5	PRT	47.5
12	ESP	16572	ESP	16553	ESP	16612	ESP	84.6	ESP	67.0	ESP	71.4	ESP	50.4
11	ITA	20078	SWE	20682	ITA	20439	AUS	75.1	AUS	58.3	AUS	55.7	AUS	41.1
10	CAN	20698	FIN	20818	GBR	21089	GBR	85.3	ITA	67.8	DNK	63.6	ITA	51.3
9	GBR	21407	ITA	20876	FIN	21506	ITA	88.2	GBR	67.6	CAN	65.2	DNK	45.6
8	AUS	22592	GBR	20915	SWE	22175	DNK	80.2	DNK	62.7	GBR	73.3	GBR	51.1

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Table 6: *continued*

Rank	**GNP/cap (exchange rate)**		**GNI/cap (PPP)**		**GNP/cap (PPP)**		**Atkinson ($\epsilon = 1$) (% of GNP/cap, PPP)**		**Sen (% of GNP/cap, PPP)**		**Atkinson ($\epsilon = 2$) (% of GNP/cap, PPP)**		**Dagum (% of GNP/cap, PPP)**	
7	SWE	28792	AUS	22314	AUS	22625	SWE	85.0	SWE	68.9	SWE	70.3	CAN	48.1
6	FIN	29121	NLD	22712	BEL	22756	CAN	81.7	CAN	64.9	ITA	77.9	SWE	52.5
5	BEL	29878	CAN	23470	NLD	22976	FIN	92.8	NLD	70.6	NOR	62.8	NLD	54.6
4	NLD	30209	BEL	23975	DNK	23170	NLD	87.0	FIN	76.4	NLD	74.0	BEL	57.6
3	USA	30592	DNK	24218	CAN	23606	BEL	89.3	BEL	73.1	USA	56.8	NOR	50.0
2	DNK	37004	NOR	26977	NOR	26340	NOR	80.2	NOR	66.7	BEL	78.9	FIN	61.8
1	NOR	37538	USA	29852	USA	31142	USA	76.7	USA	62.1	FIN	86.4	USA	45.0

For definition of columns, see notes in Tables 2 and 4.

[a]: Income data of Mongolia (MNG), Laos (LAO), and Bahamas (BHS) from 1996.

[b]: Income data of Portugal (PRT) and New Zealand (NZL) from 1997.

Table 7: **Test of sensitivity by using alternative Gini coefficients simultaneously**

Year	Country	Gini used	based on	Alternative Gini	based on	Changes in ranking[a] Atkinson ($\epsilon = 1$)	Sen	Atkinson ($\epsilon = 2$)	Dagum
1960	Brazil	53.0	I G H	54.0	I G P	+2	-	+5	-2
	Chile	45.6	I G H	44.0	I G P	-	-	+1	+1
	Jamaica	54.3	I G H	56.0	I G P	-8	-1	-13	-2
	Sri Lanka	47.0	I G H	44.0	I G P	-	-	-	+2
	Mexico	53.0	I G H	55.5	I G H	-	-1	-2	-1
	Philippines	49.7	I G H	48.0	I G P	-	-	+1	+1
	Sweden	37.9	I G H	33.4	I N H	-	+1	+2	+1
1970	Mexico	57.7	I G H	52.2	I G H	+3	+1	+2	+1
	Sierra Leone	60.8	I G H	56.0	I G P	-	-	+2	+1
	Sweden	31.4	I G H	27.3	I N H	+1	+1	+3	+1
1980	Australia	40.0	I G H	38.6	I G F[b]	+1	+2	-	-
	Canada	31.8	I G F	36.4	I G F[b]	-4	-3	-6	-6
	Spain	34.2	I G H[c]	26.8	E N H	+2	+2	+2	+2
	France	34.9	I G H	31.7	I N H	-1	-	+3	+2
	Norway	31.2	I N H	26.2	I N H[b]	+6	+4	+8	+4
	Sweden	29.4	I G H	32.4	I N H	-2	-2	-2	-2
1990	Australia	37.3	I G H	32.8	I N H	+1	+2	+1	+3
	Brazil	59.6	I G P	63.4	I G P	-1	-1	-1	-6
	Chile	56.1	I - -[d]	51.9	I G P	-	+3	-	+4
	China	34.6	I G P	33.5	I - H[d]	-	-	-	-
	Denmark	33.1	I G H	39.0	I G F	-3	-2	-2	-4
	Algeria	38.7	E N P	40.1	E - H[d]	-	-1	-2	-3
	Finland	26.1	I N H	20.2	I N Heq[c]	+1	+1	+4	+3
	Ghana	36.7	E N P	33.9	E - Hpc	-	-	-	-
	Ireland	34.6	I N H	38.9	I G H	-	-2	-	-1
	Jordan	40.7	E N P	43.4	E - Hpc[d]	-1	-2	-2	-2
	Kenya	54.4	E N P	57.5	E - Hpc[d]	-	-	-	+1
	Mexico	55.0	I G P	46.9	I G H	+2	+2	+6	+5
	Nigeria	41.2	E N P	45.0	E - Hpc[d]	-2	-1	-2	-1
	Pakistan	31.4	E N H	32.4	I G H	+1	-	-	-

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Table 7: *continued*

Year	Country	Gini used	based on	Alternative Gini	based on	Changes in ranking[a] Atkinson ($\epsilon = 1$)	Sen	Atkinson ($\epsilon = 2$)	Dagum
	Philippines	44.7	I G H[c]	45.7	I G P	-1	-	-1	-
	Sweden	29.0	I G H	32.5	I N H	+1	-2	-1	-2
	Uganda	33.0	E N Heq	44.4	E - H[d]	-	-2	-3	-2
	Zambia	48.3	E - H[d]	43.5	E N P	+3	+1	+4	+1
1998	Canada	35.1	I G H	31.5	I N H	+2	-	+3	+1
	Denmark	37.4	I G F[c]	33.7	I N F[c]	+1	+1	+3	+2
	Italy	32.2	I N H	28.7	I G H	-	+1	-2	+2
	Madagascar	43.4	E N P	46.0	E - Hpc[d]	-	-1	-1	-1
	Norway	33.0	I N H	31.8	I G H	-	-	+2	+1
	Sweden	31.1	I G H	32.4	I N P	-1	-1	-2	-3
	Turkey	41.5	E - Hpc[d]	49.0	I N H[c]	-1	-2	-1	-4
	USA	37.9	I G F	34.3	I N Heq	-	-	+2	-

[a]: A positive sign corresponds to a higher rank, a negative one indicates a worsening in ranking.
Inequality data applied is predominantly provided by Deininger and Squire (1996). Additional data sources are indicated as follows.
[b]: Data originally provided by Luxembourg Income Study.
[c]: See WIID (2000) for further information on data source.
[d]: Data taken from the World Bank (WB, 2002).
Income concept is either income (I) or expenditure (E), and both concepts can be gross (G) or net (N).
Unit of reference can be per person (P), household (H), or household per capita (Hpc). If any component is not reported or unknown, - is shown.

Table 8: **Determinants of Gini coefficients**

	(1)		(2)	
Expenditure	-3.89**	(0.38)	-3.59**	(0.38)
Net income	-1.94**	(0.27)	1.38**	(0.47)
Unknown income	1.66	(1.43)	1.81	(1.40)
Household	0.99**	(0.28)	1.09**	(0.27)
Family	0.73	(0.45)	0.85	(0.44)
Unknown reference unit	-1.51	(1.55)	-1.45	(1.52)
Equivalized	-4.72**	(0.30)	-4.46**	(0.29)
Primary source unknown	1.81**	(0.63)	1.93**	(0.61)
No consistent source	-0.31	(0.25)	-0.34	(0.24)
OECD * Net income			-4.74**	(0.55)
Intercept	36.03**	(0.26)	35.84**	(0.26)
N	2070		2070	
R^2	0.21		0.24	

Significance levels: $*$: 5% $**$: 1%; Standard errors in parentheses.

Table 9: **Change in rankings due to adjusted Gini coefficients**

	No change	1 Rank	2 Ranks	3 Ranks	4+ Ranks
Sen measure					
1960	35	7	0	0	1
1970	28	18	2	0	0
1980	26	22	6	2	1
1990	42	22	3	3	0
1998	37	24	7	2	1
Dagum measure					
1960	24	12	7	0	0
1970	29	14	1	4	0
1980	26	21	7	3	0
1990	31	21	15	3	0
1998	29	33	6	1	2

Table 10: **Average Gini coefficients over time**

Year	Average Gini	Average adjusted Gini	Number of observations
1960s	37.9	38.6	197
1970s	34.8	36.2	427
1980s	32.7	34.7	780
1990s	34.3	36.6	666

Adjusted Gini coefficients are based on regression 1 reported in Table 8.

Table 11: **Temporal trends in inequality and Kuznets curve**

	(1)		**(2)**		**(3)**		**(4)**	
Intercept	34.55**	(0.19)	39.77**	(0.89)	37.22**	(0.82)	40.63**	(1.06)
Dummy 1960s	1.31**	(0.40)	1.36**	(0.40)				
Dummy 1970s	-0.45	(0.32)	-0.44	(0.32)				
Dummy 1980s	-1.23**	(0.26)	-1.24**	(0.26)				
Income per capita					-0.20**	(0.06)	-0.75**	(0.16)
Income per capita, inverse					1.03	(1.61)		
Income per capita, squared							0.02**	(0.00)
N	2070		2070		1570		1570	
R^2	0.03		0.03		0.01		0.02	

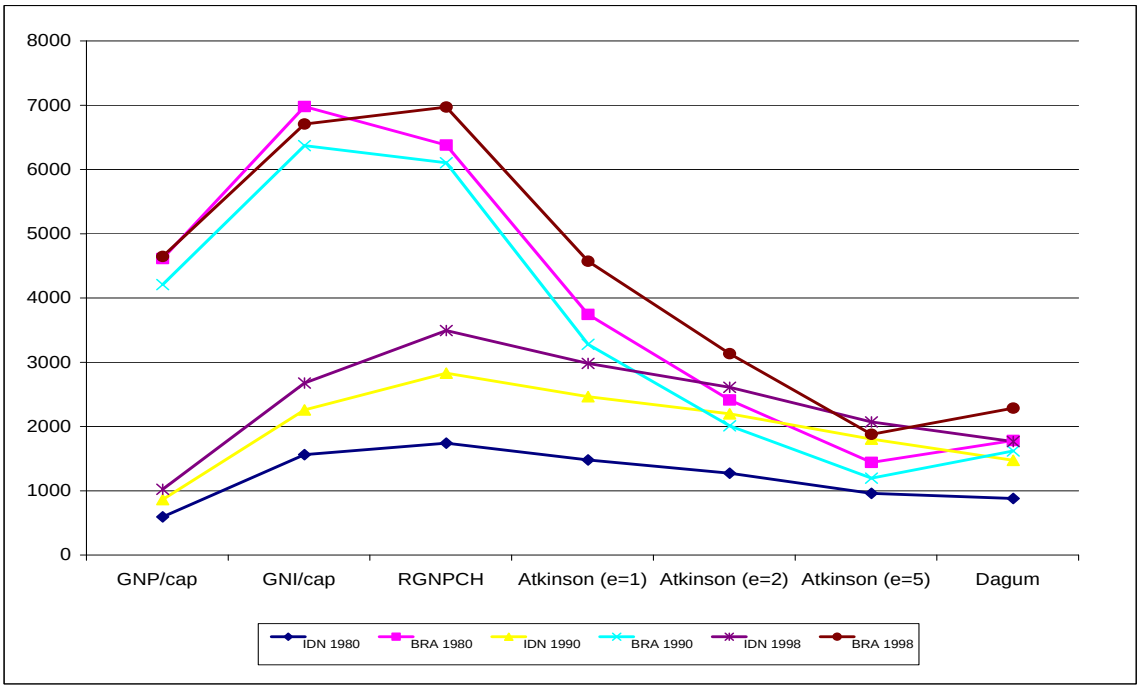
Significance levels: $*$: 5% $**$: 1%; Standard errors in parentheses.
Specification (1) estimates fixed effects, specification (2) random effects. Reference category is the period 1990-1998. Specifications (3) and (4) test for the Kuznets hypothesis using a fixed effects estimation.

Table 12: **Income mobility, 1970-1998**

		1998				
		1st	**2nd**	**3rd**	**4th**	**5th**
	1st	35	7	0	0	0
	2nd	25	10	4	2	0
1970	**3rd**	16	13	13	6	0
	4th	4	14	28	47	28
	5th	0	0	0	10	98

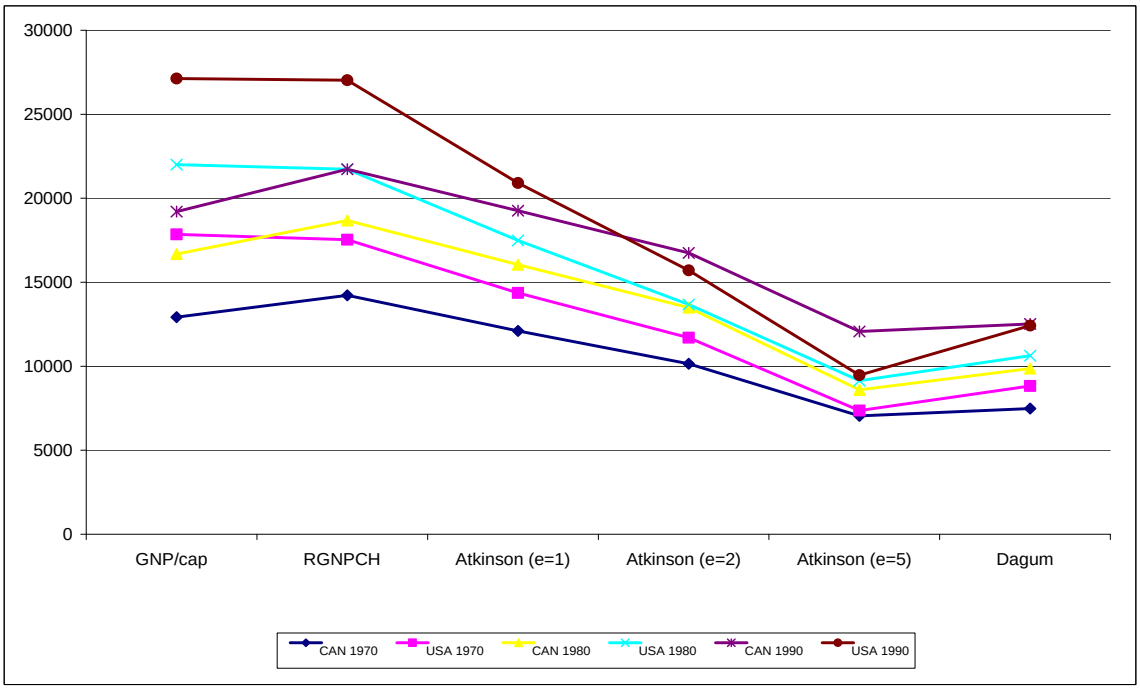
Rows and columns show the number of country quintiles falling into the first to fifth world quintile in 1970 and 1998, respectively.

Figure 1: **Welfare comparison: Brazil versus Indonesia, 1980-1998**



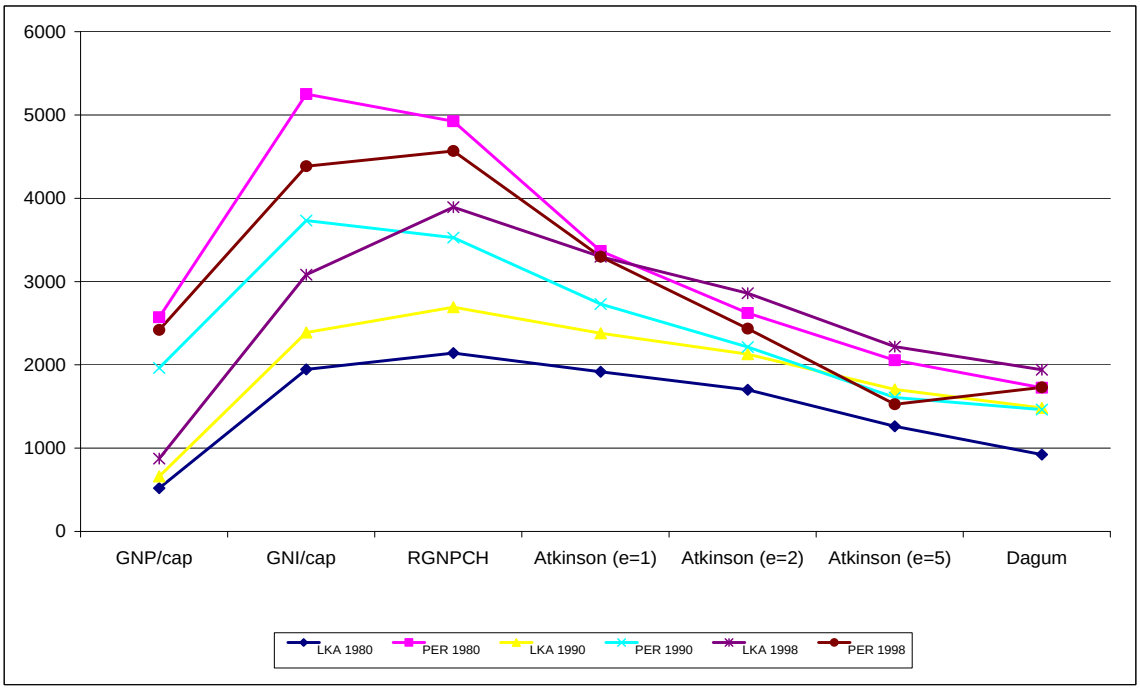
Notes: GNP/cap: GNP per capita, constant 1996 US-Dollars (WDI, 1999, 2001). GNI/cap: Real GNI per capita, 1996 prices (WDI, 2002). RGNPCH: Real GNP per capita, 1996 prices (Summers and Heston, 1991; Heston, Summers, and Aten, 2001).

Figure 2: **Welfare comparison: Canada versus USA, 1970-1990**



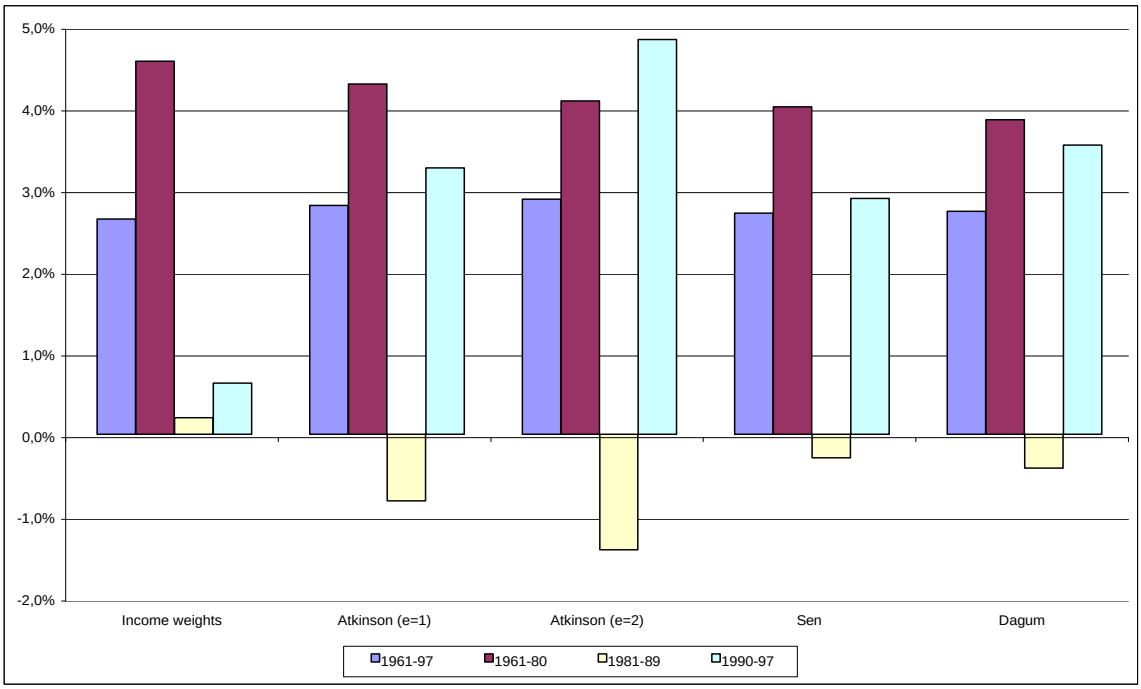
Notes: For definition of incomes see notes in Figure 1.

Figure 3: **Welfare comparison: Sri Lanka versus Peru, 1980-1998**



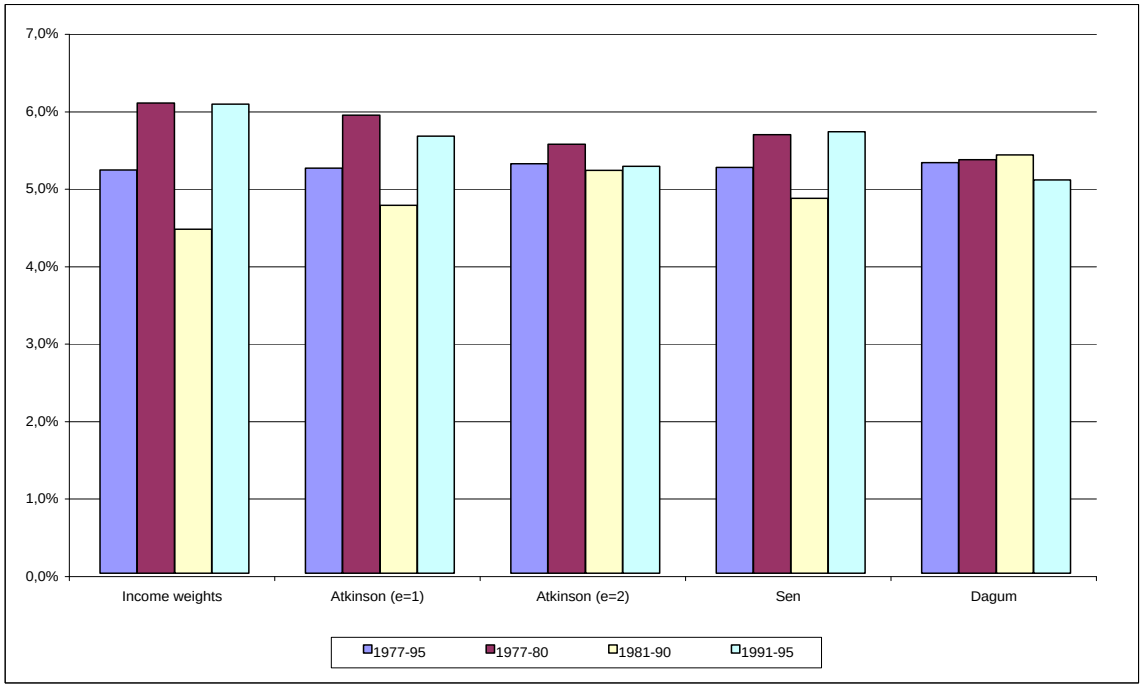
Notes: For definition of incomes see notes in Figure 1.

Figure 4: **Average annual growth of well-being in Brazil**



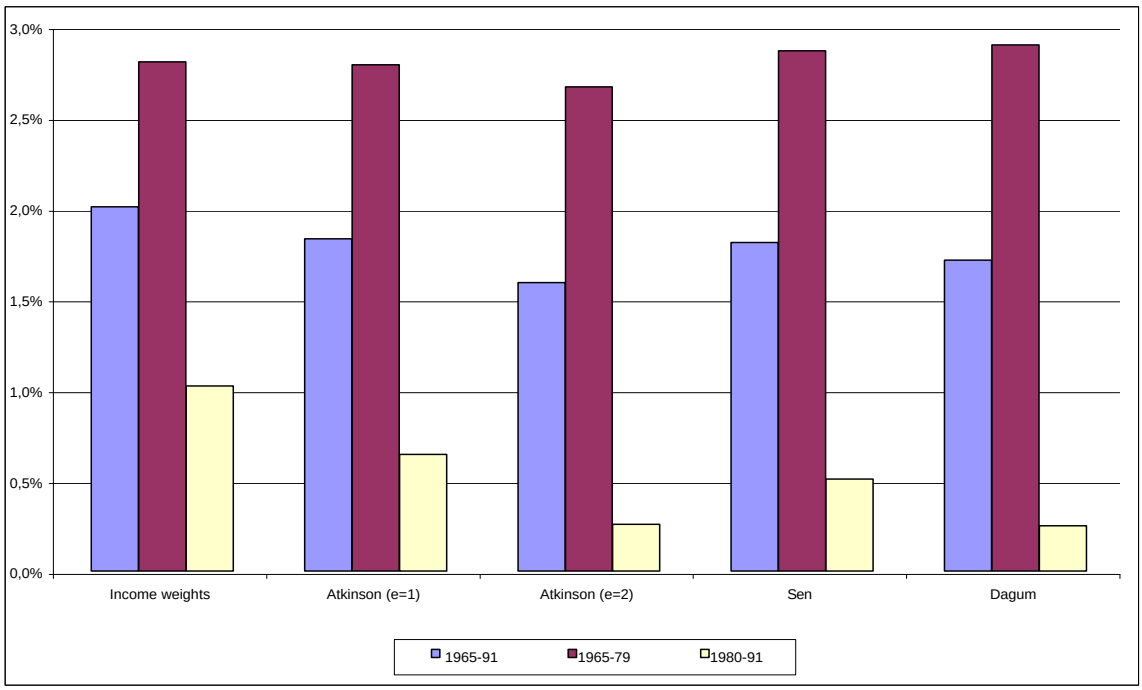
Notes: The income concept used here is GDP per capita at market prices in constant local currency (WDI, 2002).

Figure 5: **Average annual growth of well-being in Indonesia**



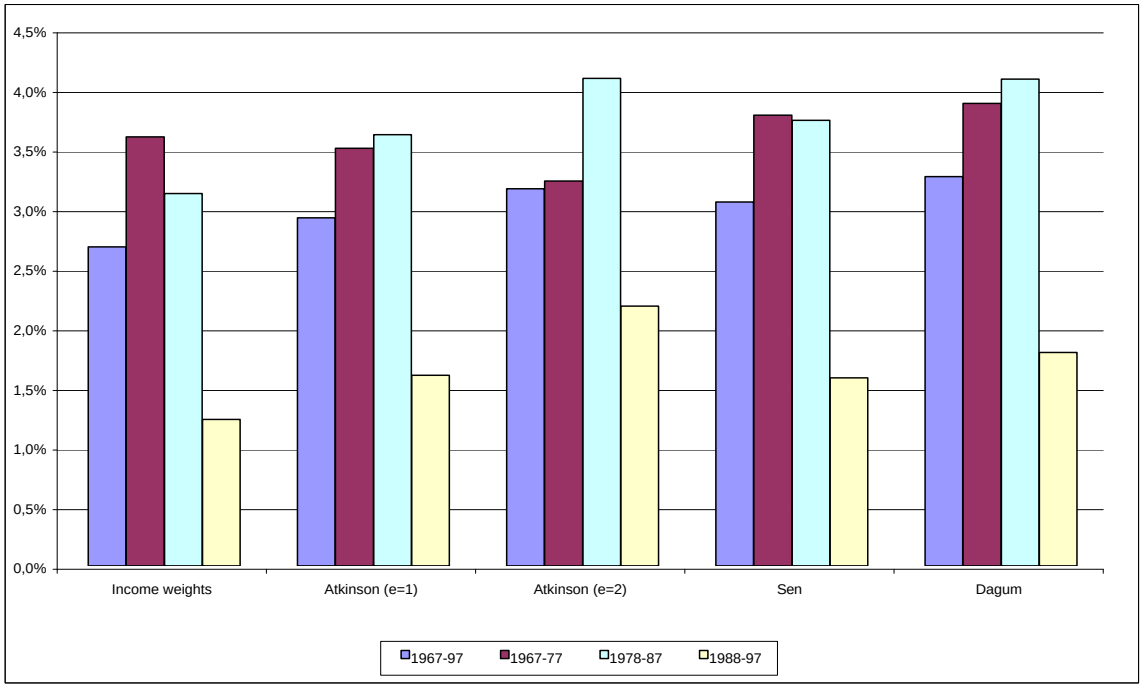
Notes: See notes in Figure 4.

Figure 6: **Average annual growth of well-being in Canada**



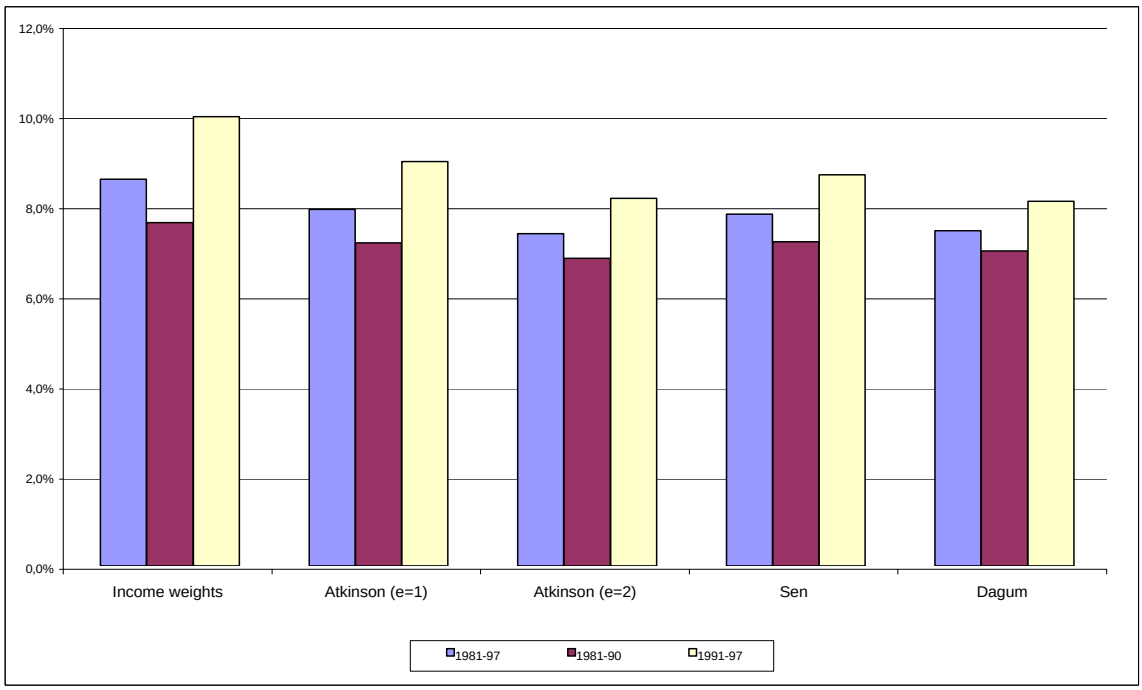
Notes: See notes in Figure 4.

Figure 7: **Average annual growth of well-being in Finland**



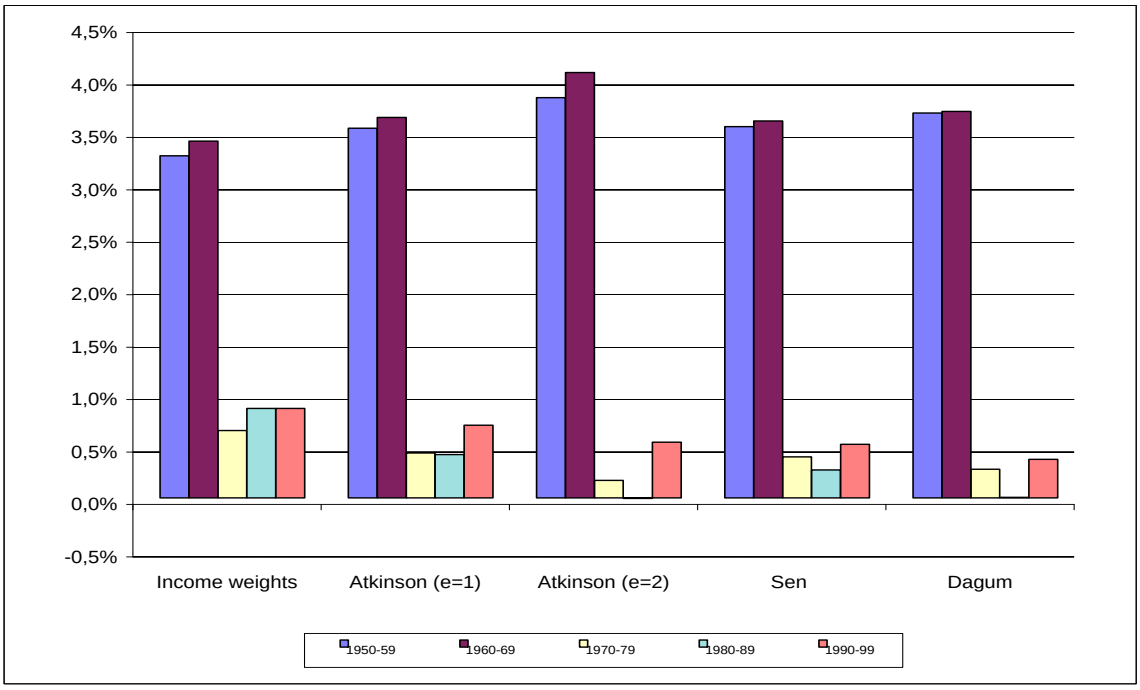
Notes: See notes in Figure 4.

Figure 8: **Average annual growth of well-being in China**



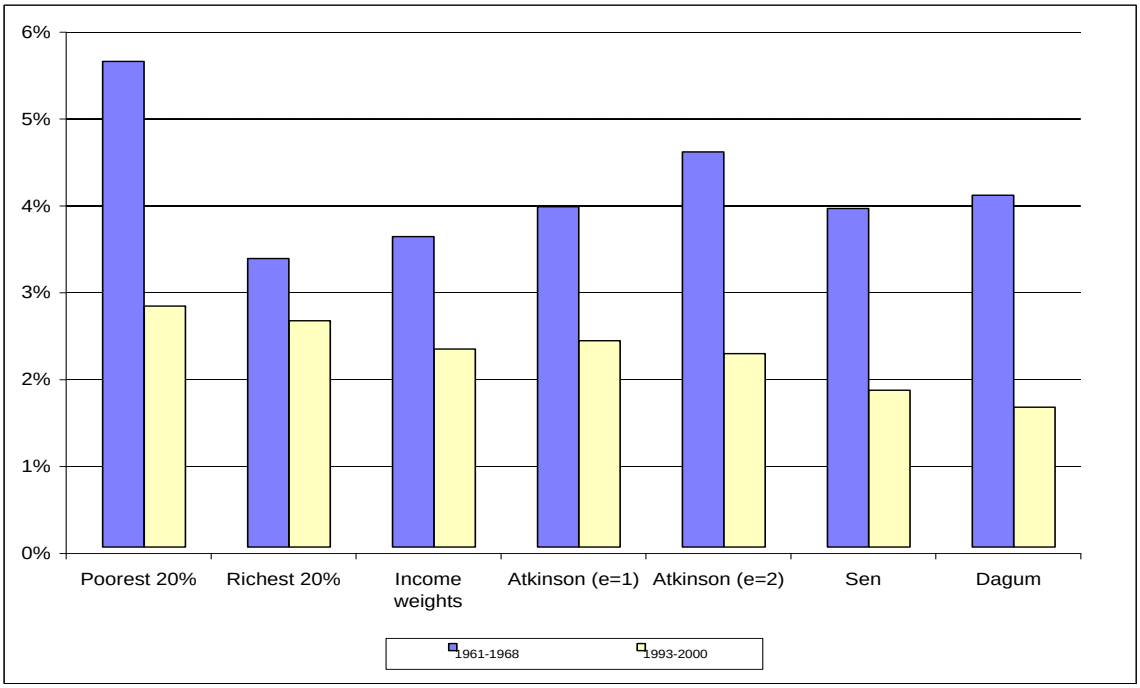
Notes: See notes in Figure 4.

Figure 9: **Average annual growth of well-being in the US**



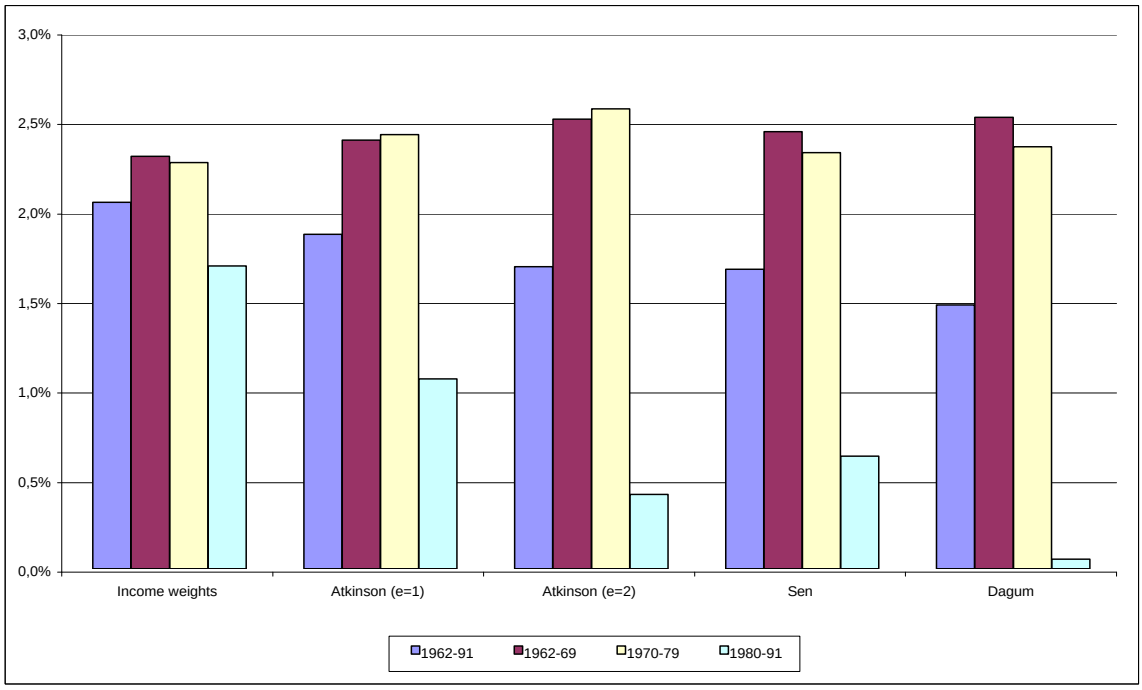
Notes: Calculations are based on U.S. census data.

Figure 10: **'Great society versus new economy'**



Notes: See notes in Figure 9.

Figure 11: **Average annual growth of well-being in Great Britain**



Notes: See notes in Figure 4.

Figure 12: **World well-being (excluding socialist countries), 1970-1998**

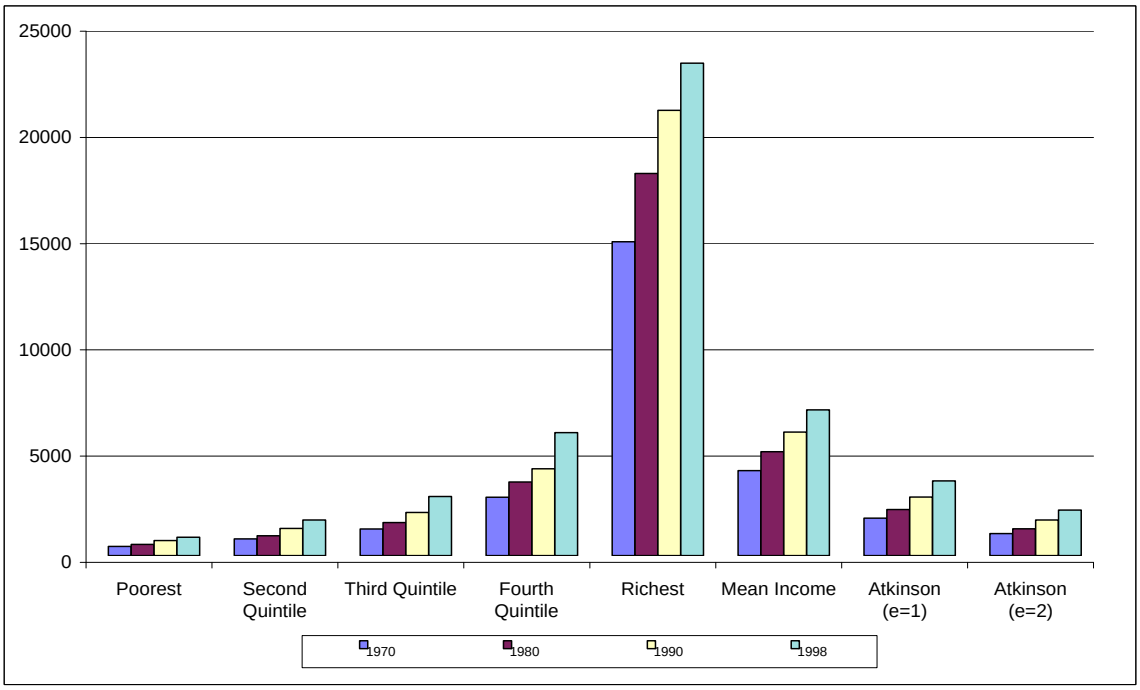


Figure 13: **Growth in world well-being (excluding socialist countries), 1970-1998**

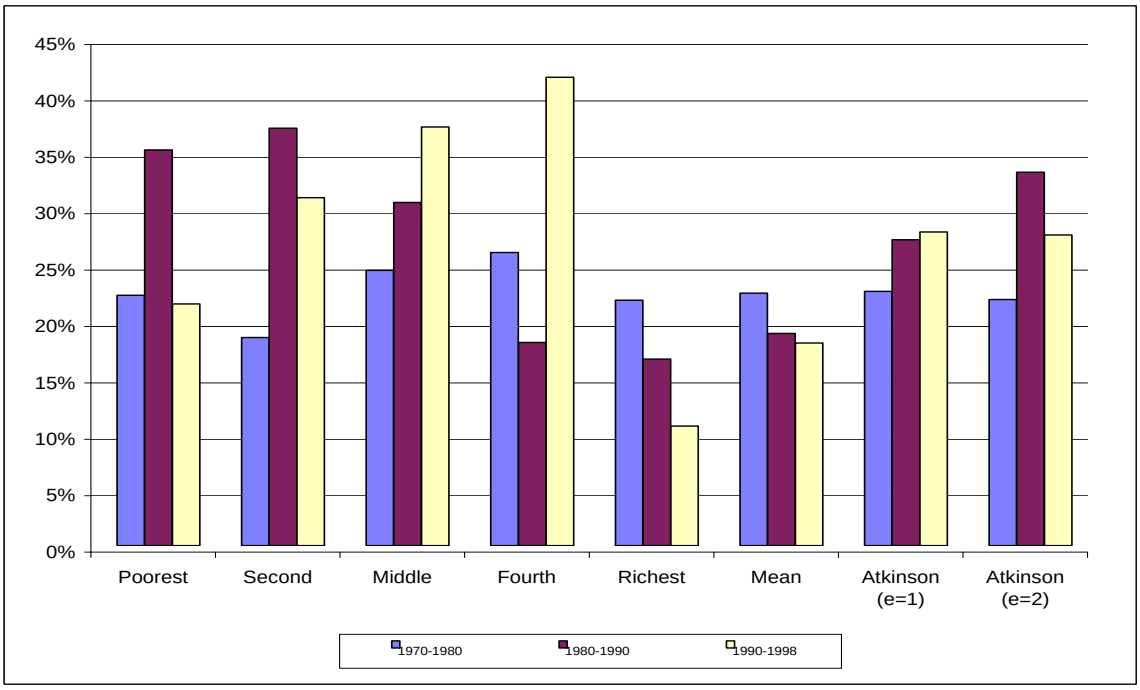
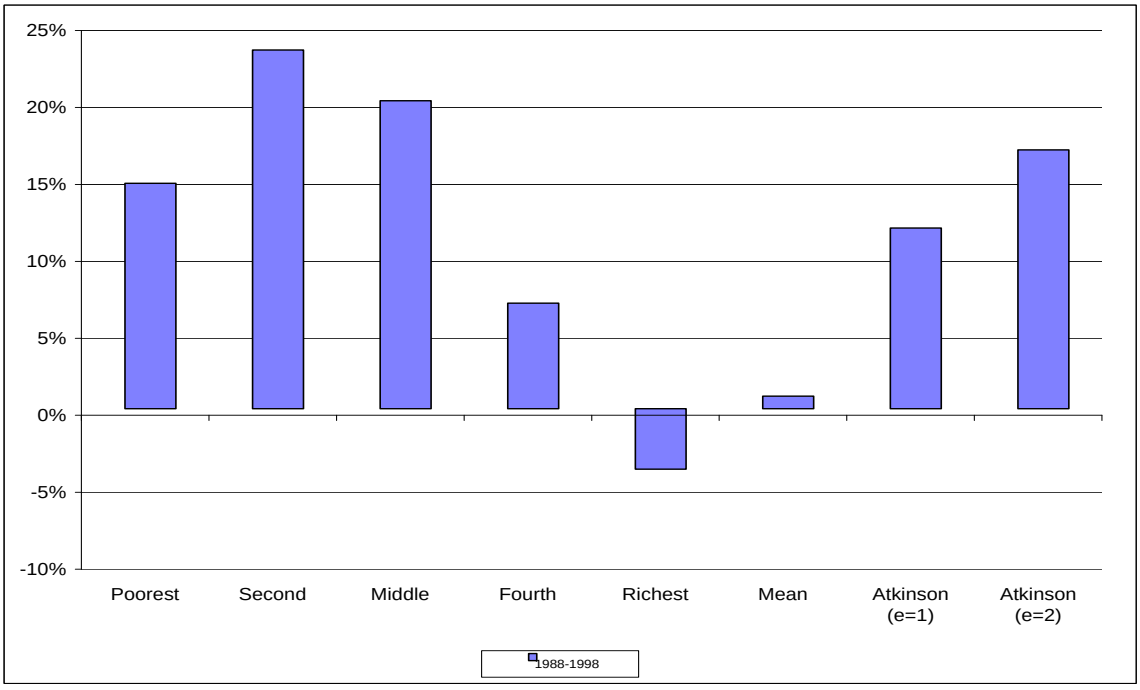


Figure 14: **Growth in world well-being (including socialist countries), 1988-1998**



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