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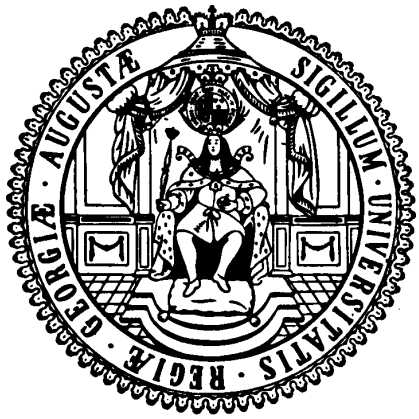

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Growth, Inequality, and Well-Being: Intertemporal and Global Comparisons*

Carola Grün† and Stephan Klasen‡

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Abstract

We use several well-being measures that combine average income with a measure of inequality to undertake intertemporal and global comparisons of well-being. The conclusions emerging from the intertemporal analysis are that the impact of these measures on temporal trends in well-being is relatively small on average, but changing across the decades. In particular, it suggests that changes in well-being were understated in the 1960s and 1970s and overstated in the 1980s and 1990s. Our global analysis covering ca. 81 per cent of the world's population demonstrates that global well-being is at least 50 per cent smaller than world per capita income if the unequal income distribution is also factored in. Conversely, growth in world well-being has been larger than world income growth between 1970-1998. Since the inclusion of inequality has an important impact on well-being comparisons, it is of great importance to generate more consistent and intertemporally as well as internationally comparable data on inequality.

JEL classification: I31, D63

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1 Introduction

Despite its well-known short-comings (including well-known omissions, the neglect of stock changes, the inclusion of defensive expenditures, etc.), 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 pragmatic. GNP as well as GDP are important measures of production possibility and business cycles. Hence, 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 some 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, 2002; Ravallion, 1997).

Nevertheless, it continues to be the case that its neglect of income distribution is one of the most serious and easily corrected 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. A range of measures for well-being that make use of this insight and combine mean income with some measure of income inequality arrive at better measures of welfare (and changes thereof) 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. While Grün and Klasen (2003) focuses on applying these measures to international comparisons of well-being for specific benchmark years, the focus of this paper is to examine intertemporal and global comparisons of well-being using such inequality-adjusted well-being measures. In the process, we will also be able to examine trends in between- and within-country inequality over time as well as changes in global inequality and thus contribute to the literature focusing on those debates (e.g. Cornia and Court, 2001; Milanovic, 2002; Ravallion, 2002).

The paper is organised as follows: the next section briefly summarises the theoretical issues involved in comparing well-being across 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 intertemporal analysis. Findings from our global analysis are discussed in section 6 and section 7 concludes.

[1] There are other well-being indicators that have attempted to address some of the short-comings of the GNP measure including Nordhaus and Tobin (1972); UNDP (2002); Osberg and Sharpe (2001); World Bank (2002b). None of these, however, are primarily concerned with tackling the distributional issue addressed here.

2 Well-Being and Real-Income Comparisons: Theoretical Considerations

Despite a long history, the theory of welfare judgements across space and time continues to be beset with conceptual and practical problems[2]. Ever since it became evident that social choice theory was not yielding acceptable[3] procedures for making social welfare judgements, such judgements have been based on axiomatic approaches to welfare measurement. Those are based on a conceptualisation 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 generates 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 comparisons, as undertaken here, however, address a different question. They 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).

For a global analysis, the aggregation of incomes poses an additional practical problem, that of the appropriate exchange rate. 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 this particular short-coming.[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 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. It can be derived from utilitarian welfare economics, thus focusing on a consequentialist approach to welfare measurement, using three alternative sets of assumptions. One set would demand everyone to have identical unchanging cardinal utility

[2]For a related discussion, see also Grün and Klasen (2001) and Grün and Klasen (2003).

[3]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.

[4]The ICP produces estimates of the economies' main aggregates adjusted for purchasing power differences in benchmark years, which are then interpolated and extrapolated to non-benchmark years.(UN, 1992). Unfortunately, not all countries participate in each round of the survey, including China that never participated and India who participated last in 1985. For these countries, PPP conversion factors had to be estimated which limits the reliability of estimates for those countries.

[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 shown by Grün and Klasen (2003), PPP adjustments can differ in their outcomes as the differences between the World Bank estimates and the Penn World Tables demonstrate. For a critical assessment of the concept and current use of PPP in the context of poverty measurement see Reddy and Pogge (2002).

functions where income (or consumption)[6] 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, social welfare is recovered 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 are necessary for all real income comparisons, one has 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. 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 as well as subjective well-being) clearly suggest that utility functions are not linear in income or consumption, nor that the existing distribution of incomes is 'optimal' from a social welfare point of view.[7] Instead, these theoretical and empirical considerations point to concave or interdependent utility functions, i.e. 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 capability approach (Sen, 1987) which calls for a maximisation 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 space.[9] Similarly, application of Rawlsian principles would also suggest that welfare is higher in societies where inequality is lower (Rawls, 1971).[10]

[6]We abstract from the difficulties associated with the treatment of saving in an indicator of welfare. For a discussion, see Osberg and Sharpe (2002).

[7]See for example Alesina, Di Tella, and MacCulloch (2002) who show with the help of U.S. happiness data and the Euro-Barometer Survey Series that income inequality negatively affects the utility level of individuals, even though personal characteristics like individual income are controlled for. For similar findings, see Blanchflower and Oswald (2003); Schwarze and Härpfer (2002).

[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).

[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 generalises 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).

One approach to improve upon the welfare content of real income comparisons is therefore to jettison this neglect of income distribution and account for the welfare-reducing effect of inequality, which would be consistent with reasonable assumptions in a utilitarian or the above-mentioned non-utilitarian views of welfare.[11] Each of the measures proposed in the next chapter does precisely this in slightly different ways.

Before turning to this issue, however, it seems useful to consider one explicit objection to the incorporation of distributional issues in an assessment of well-being. It could be argued that higher inequality will lead to higher subsequent growth rates, so that one should explicitly consider this trade-off in a welfare assessment. The reason for such trade-off might be related to higher inequality promoting savings[12] or to the incentive problems associated with redistribution policies (often relying on progressive taxation of labor earnings and profits).

While this is a potentially powerful argument, it is just one of many dynamic considerations that would need to be considered in an intertemporal assessment of well-being. Other issues to be considered in such an intertemporal assessment would include the role of savings, longevity, human capital accumulation, population dynamics, depreciation of natural, physical, and human capital.[13] These issues go beyond the scope of this paper.[14]

In addition, 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 Rodrik, 1994; Clarke, 1995; Persson and Tabellini, 1994; Klasen, 2002). While these findings are still tentative and subject to some debate,[15] 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 Inequality-Adjusted Well-Being Measures

This section describes the well-being measures that jointly consider per capita income and its distribution and therefore avoid the particularly problematic neglect of income

[11] This approach would also retain the consequentialist logic of the utilitarian calculus which evaluates a state of affairs by the consequences it generates, with no emphasis on procedural issues. One might argue, however, that it is important to consider inequality also for procedural questions as high inequality effectively limits the choices for those at the bottom of the distribution. For a discussion, see Sen (1999).

[12] Assuming a Keynesian consumption function, a more unequal distribution of income leads to higher aggregate savings which is one of the main determinants of per capita income (and, at least in the short run, the growth thereof) in any growth model.

[13] For a discussion of some of these issues, see for example World Bank (2002b); Berry, Bourguignon, and Morrison (1991).

[14] Thus we will also not be able to deal with the potentially interesting but conceptually and empirically very difficult issue of life-time incomes and its distribution, which has to take into account both the life-time income profile of incomes as well as an assessment of the distribution of longevity.

[15] See, for example, Forbes (2000) and Lundberg and Squire (2001). The last-named 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 poor countries, while it has a different effect for income growth among richer countries; the former study finds that increases in income inequality in a country appear to be correlated with higher growth in the subsequent five years, but there are serious questions about the reliability of making inferences based on the small and error-prone intertemporal variation of inequality data within a country over time.

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:

$$W = \mu(1 - I), \qquad 0 \leq I \leq 1. \tag{1}$$

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. Several measures will be considered because there are differences with respect to the type and intensity of the 'welfare penalty' that is imposed. Also, 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:

$$S = \mu(1 - G). \tag{2}$$

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 relation of their income to the entire income distribution (Dagum, 1990). Thus, preferences are assumed to be interdependent which accords well with recent experimental and empirical findings on inequality aversion and the link between income distribution and reported well-being (e.g. Easterlin, 1995; Banerjee, 1997; Amiel, Creedy, and Hurn, 1999; Blanchflower and Oswald, 2003; Schwarze and Härpfer, 2002; Alesina, Di Tella, and MacCulloch, 2002). The measure also has a nice graphical illustration. As discussed by Sen (1997), it represents twice the area below the generalized Lorenz Curve (which in turn is the Lorenz curve scaled up by mean income).[16]

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

$$D = \frac{\mu(1 - G)}{1 + G} = \mu(1 - \frac{2G}{1 + G}). \tag{3}$$

Clearly, the Dagum measure is a more extreme version of the Sen measure as it results in a higher penalty 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.[17]

In addition, two versions of the Atkinson welfare measure are presented. 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*,

[16]It thus maps the population from poorest to richest on the x-axis to the cumulative income share multiplied by mean income on the y-axis.

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

as the welfare measure itself.[18] 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 given in equation (4):[19]

$$A2 = \left[\frac{1}{N}\sum_{i=1}^{N} x_i^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}. \tag{4}$$

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

$$ln(A1) = \frac{1}{N}\sum_{i=1}^{N} ln(x_i). \tag{5}$$

The Atkinson measures can be derived from social welfare functions that are additively separable functions of the individual incomes x_i. 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 $\varepsilon = 2$ penalises 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.[20] Most of the non-utilitarian theories suggested above would, in fact, require considerably higher inequality aversion.[21]

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. 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 $\varepsilon = 1$

[18] 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).

[19] 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.

[20] For different ways to measure inequality aversion and their results, see Stodder (1991); Amiel, Creedy, and Hurn (1999). See also discussion below.

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

measure, which also weights a percentage increase the same regardless of its recipient.[22] Thus, it will not be reported separately here. But the similarity between this measure and the Atkinson measure gives another justification for the Atkinson measure.

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.[23] 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. As is already stated above, the Atkinson measures only consider individual incomes in an assessment of well-being while the Sen and Dagum measures consider relative incomes, i.e. the income distribution itself has a separate impact on well-being (apart from its impact on the levels of individual incomes). As a result, the two groups of measures obey different properties. While all measures are consistent with the Dalton principle of transfers,[24] the Atkinson measures additionally obeys a condition called transfer sensitivity. 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). Most would agree that this is, at first blush, 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. The difference occurs 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 many see this as an undesirable property of the Gini-based measures, there is some empirical support that such income comparisons at the mode of the distribution are indeed highly relevant for welfare assessments.[25]

Secondly, the Atkinson measures are subgroup consistent (implying that any increase in inequality in a subgroup will raise overall inequality and thus lower overall welfare), they are consistent with the Pareto principle (an increase in income of one person, holding all other incomes constant, will increase welfare) and are Generalized Lorenz Consistent (if a Generalized Lorenz Curve of a distribution is somewhere above and nowhere below the GLC of another distribution, welfare is higher in the former case). In contrast, none of the Gini-based measures are sub-group consistent and the Dagum measure additionally

[22] 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.

[23] For a more extensive discussion of these issues, refer to Atkinson (1970), Blackorby and Donaldson (1978), Sen (1997) and Dagum (1990).

[24] 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.

[25] For a recent study on these issues, see for example Graham and Pettinato (2002). Analysing data from Peru (covering the period 1985-2000) and Russia (1995-1998), they found that relative income differences seem to matter more for those in the middle of the distribution than for other income groups.

violates the Pareto Principle and is not Generalized Lorenz Consistent (although this only happens in rather extreme cases, see Dagum (1990)). There is some debate whether sub-group consistency is a desirable property or not. While some support it as a logically coherent requirement, others suggest that the impact of sub-group inequality on overall inequality and welfare depends heavily on the relative position of that sub-group in the overall income distribution (e.g. Sen, 1997; Dagum, 1990). Similarly, while the violation of the Pareto and Generalized Lorenz Criterion of the Dagum measure might be seen as problematic, a case can be made that such violations might be justified in extreme circumstances.[26]

While the Atkinson measures thus have more desirably theoretical properties, the experimental and empirical literature on inequality aversion and subjective well-being generally seems to find more support for the Gini-type measures.[27] Regarding the size of the penalty for inequality, there is virtual unanimity in the literature that inequality aversion is empirically observed, but the size of the well-being penalty for inequality differs greatly among individual studies, ranging from values below to above the ones considered here. It appears that studies that are investigating the impact of inequality on subjective well-being find larger inequality aversion than those based on experiments.[28] But the range of the penalty for inequality aversion considered here is well within the range found in the experimental and empirical literature.

4 The Data

For the following analysis, the main source of 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. To get recent data for developing countries as well as some OECD countries, Gini coefficients and income shares published by the World Bank's Poverty Monitor (World Bank, 2002a) and provided by the Luxembourg Income Study (LIS, 2000) are added.[29] In WIID all observations are classified as either 'reliable' or 'less reliable'. Only observations which are categorised as 'reliable' and represent the entire population of a country are considered.[30] Table 5 in the appendix shows a selection of the Gini coefficients used for 5 benchmark years. One particular problem with the intertemporal and international compatibility of these Gini coefficients is the changes in the income concept and unit upon which they are based.[31] To address this issue, we also make a regression-based adjustment of the Gini-coefficients to all base

[26]For example, if the richest person in society got a bit richer, the Pareto and Generalized Lorenz Criterion suggest an improvement of welfare. One might, however, plausibly argue that everyone else is worse off due to the greater distance they now have to the richest person and that this negative effect might outweigh the positive effect of the higher mean income. For a discussion, see Dagum (1990).

[27]See, for example, Amiel, Creedy, and Hurn (1999); Easterlin (1995); Alesina, Di Tella, and MacCulloch (2002).

[28]See for example Amiel, Creedy, and Hurn (1999); Blanchflower and Oswald (2003); Alesina, Di Tella, and MacCulloch (2002); Stodder (1991); Schwarze and Härpfer (2002).

[29]Our special thanks go to David Jesuit and Tim Smeeding for kindly providing the most recent data of several OECD countries.

[30]For a more detailed characterisation of the inequality data used, see also Grün and Klasen (2003).

[31]For a more thorough discussion of these issues, see Grün and Klasen (2003) and Atkinson and Brandolini (2001).

them on the gross income per person concept. The regression is based on all 'reliable' Gini coefficients in the WIID database and is reproduced in Table 6 in the appendix. Throughout we use the original as well as the adjusted Gini coefficients for comparative purposes.[32]

Regarding income data one could consider per capita income, per capita disposable income, or per capita consumption (from national accounts or from household surveys). To get the largest possible sample and to compare ourselves directly to per capita income as the commonly used welfare indicator, we rely on per capita gross national product[33] as presented in the national accounts as the income concept used. To compare changes in well-being across time, we use real per capita GNP in local currency units, as reported in the WDI (2002). Whenever it is necessary to make international or global comparisons, we use purchasing power adjusted real GNP per capita data provided by the Penn World Table (PWT), version 6.1 (Heston, Summers, and Aten, 2002).

For the calculation of global well-being and changes thereof between 1970 and 1998, we start by using a sub sample which consists of 73 countries representing 81 per cent percent of the world population in 1998 for which we had at least two inequality observations between 1970 and 1998. In order to reach such coverage and include some of the populous and high population growth African and Middle Eastern countries, it was necessary to assume in some cases that income inequality remained stable for sub-periods and only income growth changed, as more data are available on the latter than the former.[34] However, the main analysis disregards many of the formerly socialist countries since the PWT do not provide sufficient information to calculate PPP adjusted per capita income for this group of countries in the given period. Since many of them experienced a considerable worsening in income inequality during the transition period (Milanovic, 1998; Grün and Klasen, 2001), ignoring them in a global analysis of well-being may yield flawed results. Therefore, we expand the sample by 15 Eastern European countries and successor states of the Soviet Union, covering now 85 per cent of the world population, and make a second analysis of global well-being for the years 1988 and 1998 by using GNI per capita in PPP terms provided by WDI (2002).[35] 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

[32]We do not make a similar adjustment for quintile shares, which involves a number of difficult conceptual and econometric issues.

[33]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. We could also rely on consumption means from household surveys, but this is unavailable for many of our data points. Also, there are large and generally not well understood discrepancies between survey means and national accounts consumption data. The choice to use per capita income will influence the results on the global inequality analysis as shown by Milanovic (2002). For a discussion, see below and also Ravallion (2002).

[34]The list of countries included can be deduced from Table 5 in the appendix. All countries with at least two observations in the period 1970-1998 are included, with the exception of Bulgaria (no income data) and Sierra Leone (assuming stability of income distribution during a prolonged civil war seems problematic).

[35]In particular, we include in addition Belarus, Bulgaria, Czech Republic, Estonia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Slovak Republic, Slovenia, Turkmenistan, Ukraine, and Uzbekistan. Data on income inequality for the pre-transition period are mainly taken from Milanovic (1998); for the year 1998 we again rely on WIID (2000).

the population-weighted country quintiles contained in each world quintile.[36] These computations result in average incomes per 'world quintile' based on which we calculated the Atkinson measure with $\varepsilon = 1$ and $\varepsilon = 2$.

5 Within-Country Well-Being Comparisons over Time

As shown in detail in Grün and Klasen (2003), the application of the proposed measures has a significant impact on levels of well-being. Compared to per capita income, our inequality-adjusted well-being measures are between 15-70% lower, depending on the country and the measure used. So while these measures have a significant impact on reported levels of well-being, we investigate here whether they change our impression of changes in well-being. To do that, we need to investigate to what extent inequality has changed over time.

To get a first impression of trends in inequality, Table 1 shows average Gini coefficients from the 1960s to the 1990s. What emerges is, on the whole, a great deal of stability (see also Deininger and Squire, 1998; Lundberg and Squire, 2001). At the same time, there appears to be a noticeable decline in inequality in the 1970s and 1980s and an increase in the 1990s.[37] Since these trends could be driven by compositional changes in the income definition used, Column 3 therefore summarizes adjusted Gini coefficients which are now all based on the same specification, namely gross income per person.[38] The average adjusted Gini coefficient is somewhat higher (as expected), but follows the same if somewhat muted temporal trend as the original one. Within-country inequality appears to have fallen in the 1970s and 1980s and to have risen in the 1990s.[39]

To investigate this matter further, Table 2 presents the results of a regression analysis.[40] As a first step we investigate, controlling for country specific fixed effects and using only adjusted Gini coefficients, whether there are temporal trends in inequality.[41] Specification (1) shows the results using decade dummies. While the general impression of great stability is supported by the regression, inequality appears to have fallen in the 1970s and

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

[37] As the Gini coefficient is based on a sample, one could, in theory, construct confidence intervals to then better assess the significance of reported trends. Unfortunately, the sample sizes are generally not reported in the WIID database. But the vast majority of Gini coefficients come from household surveys which typically sample 3000-10000 households. In these orders of magnitude, the confidence intervals of these Gini coefficients are very small so that many of the changes in inequality are likely to be significant (Giles, 2002).

[38] To adjust all Gini coefficients on this particular specification, regression results from Grün and Klasen (2003), reproduced as Appendix Table 6 were used. Gini coefficients are regressed on the income definition and reference unit to determine systematic differences related to the specification the Gini coefficients. See Appendix Table 5 for the unadjusted and adjusted Gini coefficients.

[39] For a related discussion, see Cornia and Court (2001).

[40] For this and the following regression analysis, we use the entire 'reliable' data set from WIID, but only consider one observation per country and time to avoid biasing our standard errors. If several observations are available, we take the one based on gross income per person (or the next best available).

[41] All estimations were also calculated using the random effects model, where the results of the coefficients were virtually identical to the fixed effect results reported here. As we are substantively interested in inequality trends within a country over time, we report only the fixed effects results.

1980s and risen again in the 1990s (the left-out category). As illustrated by specification (2), transition countries play a significant role in determining this trend. The coefficients of all interaction variables indicate that inequality was considerably lower for this group of countries in the 1960s through 1980s than in the 1990s where it increased sharply. But even excluding the transition countries, inequality was still lower in all non-transition countries in the 1970s and 1980s than in the 1990s, although the coefficients only approach significance in those two decades.

The next two specifications investigate this issue parametrically by including a time trend and its square, one including (specification (3)) and one excluding transition countries (specification (4)). The time trend and its square is highly significant suggesting a U-pattern of within-country inequality over time, thus suggesting reversal of earlier declines in inequality. This gives some confirmation to the claim by Cornia and Court (2001), that there has been a more generalized reversal of within-country inequality in many countries of the world in the 1980s and 1990s (beyond the well-known cases of the US, UK, and transition countries). While this is a significant finding, the magnitude of the reversal should not be overemphasized. Figure 1 shows a locally weighted (non-parametric) regression of time (where 1 refers to 1960 and 39 to 1998) and the changes in inequality in a country.[42] While the falling inequality up until the mid-1980s and its subsequent reversal is clearly visible, the size of the decline and the subsequent reversal is not very large, amounting to about a 4 point drop and a subsequent 3 point increase. There is also a hint that the increase might have stabilized in the mid-1990s, and the Figure demonstrates clearly that this average performance hides a great deal of variation.

If this trend reversal turns out to be a robust finding, it has a significant impact on changes in well-being across time. Using the Sen measure and applying it to the results in Figure 1 even this relatively modest development would have understated average well-being growth in the 1960s to the 1980s by an average of about 4 percentage points, and overstated well-being growth since the 1980s by about 3 percentage points. Using the Dagum or the Atkinson (ε=2) measure would lead to a more substantial reassessment. Moreover, as shown below, the reversals in inequality were much larger in some countries where they lead to a dramatic reassessment of well-being growth in recent decades.

In Table 3 we apply fixed effects regressions to the sample of adjusted Gini coefficients to test for an intertemporal Kuznets curve, i.e. the hypothesis 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, 2001). In fact, specifications (2) and (3) rather suggest the opposite, namely a U shaped relationship, even though it is not a very distinct curve. To corroborate this finding, we additionally regressed the sample of adjusted Gini coefficients on a constant term only, assuming country specific fixed effects. The residuals capturing the time varying component of the Gini coefficients were then used as the dependent variable in a locally weighted regression. Figure 2 plots the result. Inequality first decreases with average income, but for income levels between approximately $17,000 and

[42]This is achieved by running a fixed effects regressions of the adjusted Gini coefficients without covariates, plot the residuals of that regression against time, and then run a non-parametric regression of those residuals against time.

$26,000 (i.e. high income countries), it rises again.[43] While the absence of an inverse-U has been commented upon extensively (e.g. Deininger and Squire (1996, 1998), there has been no discussion of the reverse relationship that seems to hold, on average, across a large spectrum of countries. Since per capita-income and time are, for most countries, positively correlated with each other, the findings from Figure 1 and 2 might be closely related so that it is a priori unclear whether the inequality trend is mostly a temporal trend or related to income growth. Regressions (4) through (6) investigate this by including both income and time. All three specifications seem to suggest that the income-U, i.e. declining and then rising income inequality, remains highly significant and robust even if we control for time. The temporal U also remains significant when the transition countries are included, but only approaches significance when they are excluded. Thus we confirm findings regarding inequality-reversals over time found by Cornia and Court (2001), but we additionally find strong evidence for a U-shaped relationship between income and inequality in the 1960-1998 time period. We know of no theoretical explanations that could account for such a systematic relationship, which clearly merits further investigation.

Turning to a few country experiences using our inequality-adjusted measures shows a great diversity of experiences.[44] It also demonstrates that even in countries where inequality remained stable over a long period of time, there often were significant changes in sub-periods. Figures 3 and 4 plot two typical examples. While Brazil and Indonesia differ greatly with respect to the degree of existing inequality, the income distributions itself did, in a relative sense, not vary a lot in the last decades. This results in comparatively small differences between an income growth rate and the growth rate of the distribution-adjusted income measures (illustrated by similar height of the first columns of each measure). At the same time, this general stability masks some increases and declines in inequality in those countries. For example, in Brazil income distribution appears to have become notably more unequal between 1961 and 1990. In the sub-period 1981-1989, this trend was accompanied by only moderate income growth leading not only to smaller, but negative growth rates in the inequality-adjusted welfare measures. In 1997, income inequality was at an all-time low and positive growth rates are reported for all measures for the period 1990-1997. 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 5 and 6). 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. The case of China (Figure 7) illustrates the combination of high growth and worsening inequality. In both time periods considered, income growth overstates well-being growth by 0.5-1.5 percentage points per year, with the differences being larger in the 1990s. Finally, Sri Lanka (Figure 8) is a typical example of a U-shaped pattern of inequality. From 1964-1980, inequality fell and as a result, well-being growth exceeded income growth by 1-2.5 percentage points. In the 1980s, only the Gini-based measures report further declines in inequality and thus large expansions of well-being, suggesting that middle income groups were benefitting particularly. In the

[43] While details of the curve, particularly its smoothness and the wiggle at low income levels are partly driven by the technical parameters of the locally weighted regression, including the weighting function and the bandwidth, the overall impression of a U is not affected by changing these parameters.

[44] All Gini-based measures are based on Ginis that have been standardized in the manner described above. Using unstandardized Ginis would not change the results significantly.

1990s, inequality increased and well-being therefore grew by up to two percentage points less than suggested by the income growth measure. The different measures disagree about which period led to the largest expansion of well-being. The Atkinson measures would suggest the 1964-1980 period was most successful, the Gini-based measures the 1981-1990 period, and the income growth measure the 1991-1995 period. Incorporating inequality in an assessment clearly matters for intertemporal comparisons.

Lastly, we want to briefly highlight the impact of applying distribution-sensitive measures to the more well-known cases of inequality reversals, the US, UK, and transition countries. The impact of inequality on changes in well-being in the US was already examined in Klasen (1994). Here, the analysis is extended to the year 2000 and some additional measures are presented. Data on (money family) income and inequality are taken from the Current Population Survey data from the U.S. Census Bureau (U.S. Census, 2002).[45] 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, using some of the measures.[46]

Since economic growth was particularly high between 1993-2000, one may wonder how well-being changed in the so-called 'new economy.' Figure 10 gives an impression. Since 1993, income growth 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 1980s. 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' was 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). The income data is again taken from the World Bank (WDI, 2002) but now combined with inequality series produced by the Institute of Fiscal Studies (IFS) covering the time span 1961-2000.[47] Looking at the total period, changes in well-being become gradually smaller when more and more importance is attached to the existing inequality. But again, the development within sub periods was highly diverse. In the first two decades, moderate income growth was accompanied by falling inequality thus leading to larger 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). Since the early 1990s, the distribution-adjusted measures remain below the per capita income growth rate, but the difference is not large, suggesting that inequality has worsened only slightly since then.

The impact of incorporating distribution-sensitive measures to changes in well-being in transition countries was discussed in detail in Grün and Klasen (2001). There we showed that the impact of worsening inequality increased the cumulative welfare loss in transition

[45] For a more detailed description of the data source see Klasen (1994).

[46] Also here, one can 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.

[47] Gini coefficients and income shares by decile group (based on before housing costs) are kindly provided by Jayne Taylor and Alissa Goodman.

countries between 1988 and 1995 by between 4 (Hungary) and 40 (Kyrgyzstan) percentage points, compared to an income growth measure. As a result, well-being fell by as much as 70 percentage points in Ukraine and the Kyrgyzstan, if the worsening inequality is factored in.

To briefly summarize, the analysis has shown that our distribution-sensitive measures significantly affect our impression of changes in well-being, compared to an income growth indicator. They do so particularly dramatically in the US, the UK, and transition countries, but also alter the impression of changes in well-being in many countries over particular sub-periods. We also find that, on average, there appears to be a U-trend in the evolution of inequality over time with a significant increase in inequality observed in the 1990s. It is beyond the scope of this paper to analyze potential causes for this trend, but it clearly warrants serious attention.[48]

But examination of Figures 1 and 2 as well individual country experiences suggest there is great variation around this trend, suggesting that the rise in inequality in the 1990s is far from inevitable. It thus appears that increasing income inequality observed in some industrialized and transition countries are not inevitable global processes.[49] The differences in experiences rather suggest that the role of economic policy in generating and combating income inequality is quite considerable, but a more careful investigation of these issues is clearly needed (see also Atkinson, 1997; Aghion and Williamson, 1999; Cornia and Court, 2001).

6 Global Well-Being and Inequality

As is well-known, global inequality is more a result of inequality between nations than inequality within nations (e.g. 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, one would expect that consideration of this inequality between nations should have a considerable impact on measures of well-being. Figure 12, based on a sample which captures some 81 per cent of the world population in 1998 (but leaving out quite a few of the poorest countries as well as many transition countries) shows that it does indeed. Using the Atkinson measures, world well-being is less than half of world per capita income if applying $\varepsilon = 1$ and only about a quarter if $\varepsilon = 2$ is assumed for all the years considered. This is to say that world well-being would be the same if world per capita income was only half or even a quarter of its present levels but distributed equally. Including the missing poor and transition countries, even more dramatic reductions in well-being as a result of inequality would

[48] Cornia and Court (2001) argue that neo-liberal economic policy reforms in rich and poor countries were a significant factor in causing this inequality reversal. The empirical basis for this assessment is quite weak at present and clearly merits further investigation.

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

occur. Global inequality is thus 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 examines changes in global well-being between 1970 and 1998, comparing growth in per capita income ('mean') and growth in the two inequality-adjusted Atkinson measures. Between 1970 and 1980, the Atkinson measures show slightly smaller increases, suggesting a slightly worsening global inequality. Conversely, the growth of the Atkinson measures far surpasses the growth in mean global income in the 1980s and 1990s, suggesting declining inequality. In the 1980s, it does so particularly when $\varepsilon = 2$ is used, suggesting that the poorest benefited particularly from growth then. 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 13 shows (see also Schultz, 1998). In contrast, in the 1990s, growth in the poorest world quintile was relatively small, and it was the middle quintiles which prospered particularly, while the richest quintile had relatively modest income gains. The relatively modest performance of the poorest quintile is due to the poor performance of African economies, and the widening inequality in India and China, while the middle incomes represent richer quintiles in India and China as well as prospering East Asian economies. As now African country quintiles make up most of the poorest world quintile, it is unlikely that the benign trend of falling global inequality of the 1980s and 1990s will persist, unless African countries will be able to significantly improve their growth performance and improve their income distribution.

Looking at the results for 1988-98 obtained from the expanded sample which also includes 15 transition countries, 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. Figure 14 illustrates the well-being changes between 1988 and 1998 for this second global analysis. The qualitative findings are largely the same, suggesting declining inequality between 1988 and 1998 which was particularly due to high income growth in the second and third world quintile. From a quantitative perspective, results do differ from those shown in Figure 13. Income growth per global quintile was smaller for all quintiles and the richest 20 per cent even had declining per capita incomes. The overall mean income remains nearly unchanged, while the Atkinson measures indicate positive growth rates.

The two main reasons for the differences in results are the inclusion of transition countries and the switch from the PPP income data from the PWT to the World Bank's World Development Indicators. As the World Bank's PPP data are based on an earlier ICP survey (1993) than the Penn World Table data (1996), the latter are likely to more accurately reflect PPP-adjusted income changes in the 1990s.[50]

[50]As already shown in previous studies, the World Bank's calculation assumes that incomes in many of the poorer countries are somewhat lower than in the Penn World Tables (e.g. Grün and Klasen, 2003). But not only levels, also growth rates differ considerably between the two data sources. Calculating the average change in per capita income of those countries included in both analyses between 1988 and 1998, income growth amounted to 21.1 per cent according to the PWT, but account for only 6.5 per cent when using the World Bank data. This lower growth rate, however, is not uniform across world quintiles. Although all quintiles experienced lower income growth according to the World Bank data, the differences are particularly large for the two richest quintiles. Once the transition countries are also considered, compositional changes of global quintiles seem to further add to the negative income growth

Apart from investigating changes in the global income distribution and its impact on well-being, one can also assess mobility of countries within the global income distribution. Table 4 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 218 out of the 365 country quintiles belong to the same world quintile in both years.[51] Furthermore, this stability is very much concentrated at the lower and upper tail of the world income distribution, consistent with a bi-modal distribution of world incomes (see also 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 escape the lowest quintile in the global income distribution.[52] Among the populations that managed to move upwards and reach 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 most quintiles in China, Malaysia, and Thailand, while in many African countries like Nigeria, Ethiopia, Uganda as well as Bangladesh, Colombia, and Guatemala, most quintiles experienced downward mobility. In 1998, their country quintiles are found among poorer global quintiles than in 1970. Thus despite overall rigidity in the world income distribution, there is considerable mobility for selected countries.

Thus, in line with some other work (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.[53] 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. Moreover, the future of global inequality will depend much less on economic performance in India and China and more on growth and income distribution in Africa.

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.

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of the richest quintile. In 1988, the majority of country quintiles of the transition countries belonged to the fourth and fifth global quintiles. By 1998, the transition economies considered here have experienced an average income loss of 37 per cent, thus contributing to the declines in these quintiles.

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

[52] 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, leaving room for many more smaller country quintiles to fall into the first.

[53] 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. For a discussion of national accounts versus survey data see also Ravallion (2002).

7 Concluding Remarks

From a theoretical point of view, the inclusion of income inequality in a measure of well-being is well justified. Empirical studies confirm the hypothesis that individual and thus aggregate welfare is negatively affected if incomes are more widely dispersed. Here, we tried to show that the impression of well-being across time and at the global level derived from inequality-adjusted measures sometimes drastically differs from the one obtained when looking at the mean income solely.

The intertemporal analysis has shown an average worsening of the within-country income distribution in the 1990s, after earlier improvements in the 1960s to the 1980s. While the causes are somewhat unclear and merit further investigation, the consequence is that changes in well-being in the 1990s are overstated using an income indicator. But the analysis also demonstrated that there is great variation in experiences (between countries and sub-periods) suggesting that the average trend has not uniformly affected all countries. The source of this variation in experiences also merits further analysis.

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. On the other hand, for both samples of countries considered (which unfortunately exclude many of the poorest countries) changes in global well-being are larger than suggested by the income growth measure especially since the 1980s where global inequality seems to have declined. But the global analysis also illustrates that sample composition and source of data have a significant impact on the size of the effects. Finally, comparing the composition of global income quintiles in 1970 and 1998, it is clear that some countries moved upwards and downwards the world income distribution, suggesting that there is scope for economic policy to affect one position in the global distribution.

It is important to end the analysis with a caveat. While we have shown that most of our results are quite robust to the choice of income and distribution data, both data continue to suffer from deficiencies in comparability, consistency, and reliability. This is particularly the case for income distribution data which are still often of poor quality and reported at irregular intervals with inconsistent methods. While the World Income Inequality Database has greatly facilitated access to income distribution data, future developments should be directed at improvements in their quality, consistency, and timeliness.

Table 1: **Average Gini Coefficients over Time**

Year	**Average Gini**	**Average adjusted Gini**	**Number of observations**
1960s	37.9	38.6	197
1970s	34.9	36.2	422
1980s	32.8	34.7	763
1990s	34.5	36.8	651

Adjusted Gini coefficients are based on the same specification, gross income per person. For calculating adjusted Gini coefficients, regression results to determine the influence of different specifications shown in Table 6 in the appendix were used.

Table 2: **Temporal and Regional Trends in Inequality**

	(1)		**(2)**		**(3)**		**(4)**	
Intercept	39.91**	(0.25)	39.78**	(0.25)	41.19**	(0.63)	42.22**	(0.63)
1960s	0.20	(0.50)	0.18	(0.50)	-		-	
1970s	-1.03*	(0.42)	-0.58	(0.43)	-		-	
1980s	-1.04**	(0.36)	-0.59	(0.38)	-		-	
TC * 1960s	-		-7.53	(4.14)	-		-	
TC * 1970s	-		-5.02**	(1.70)	-		-	
TC * 1980s	-		-3.59**	(1.11)	-		-	
Time	-		-		-0.27**	(0.06)	-0.19**	(0.06)
$Time^2$	-		-		0.01**	(0.00)	0.00**	(0.00)
N	974		974		974		837	
R^2	0.01		0.03		0.03		0.01	

Significance levels: $*$: 5% $**$: 1%; Standard errors in parentheses.
Although for all specifications the Hausman test favoured random effects, the estimations shown here are fixed effects as we are primarily interested in country specific fixed effects. Adjusted Gini coefficients are used as dependent variable. Specification (4) excludes transition countries (TC). Reference category is the period 1990-1998.

Table 3: **Kuznets Curve? Trends in Income and its Distribution**

	(1)		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**	
Intercept	39.63**	(0.19)	43.18**	(1.04)	45.15**	(1.07)	44.84**	(1.37)	44.62**	(1.08)	45.966**	(1.14)
Income/capita	-0.01	(0.06)	-0.80**	(0.20)	-0.94**	(0.20)	-0.91**	(0.22)	-0.91**	(0.23)	-0.984**	(0.24)
Income/capita, inverse	-0.58	(1.32)	-		-		-		-		-	
Income/capita, squared	-		0.03**	(0.01)	0.03**	(0.01)	0.03**	(0.01)	0.02**	(0.01)	0.030**	(0.01)
1960s	-		-		-		-1.13†	(0.65)	-		-	
1970s	-		-		-		-1.38**	(0.48)	-		-	
1980s	-		-		-		-1.04**	(0.37)	-		-	
Time	-		-		-		-		-0.17*	(0.07)	-0.086	(0.07)
$Time^2$	-		-		-		-		0.01**	(0.00)	0.003†	(0.00)
N	974		974		837		974		974		837	
R^2	0.00		0.02		0.03		0.03		0.04		0.04	

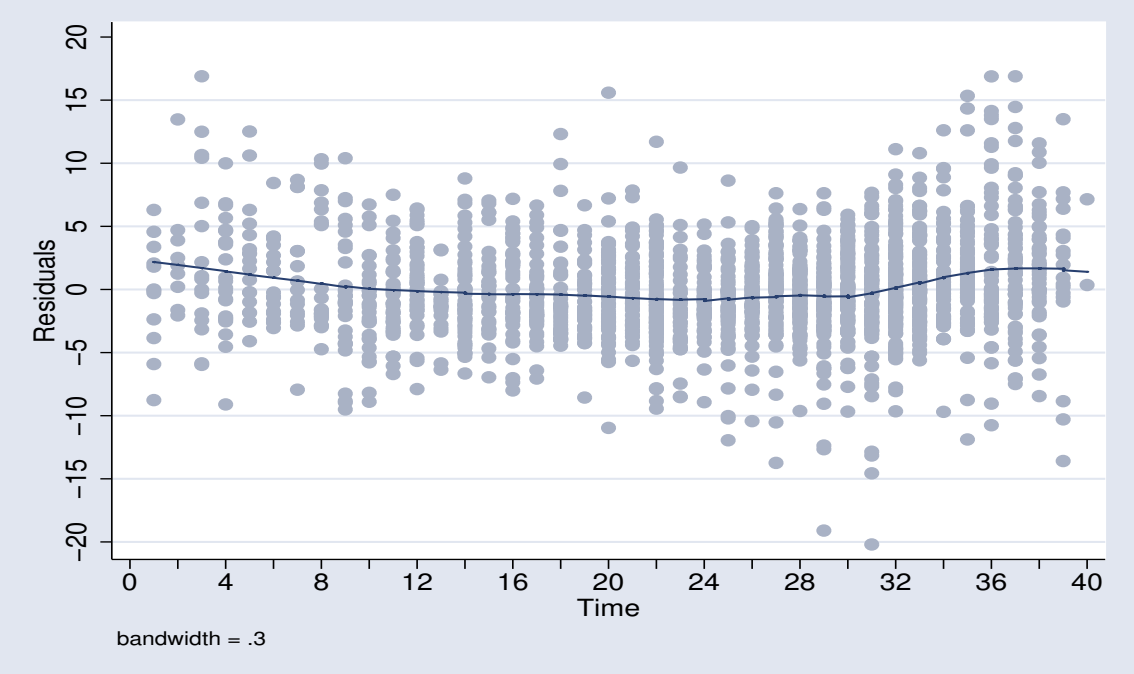
Significance levels: † : 10% * : 5% ** : 1%; Standard errors in parentheses.
All specifications estimate fixed effects. In specifications (4) and (7) transition countries are excluded.

Table 4: **Income Mobility between World Quintiles, 1970-1998**

		1998				
		1st	**2nd**	**3rd**	**4th**	**5th**
	1st	41	3	1	0	0
	2nd	21	16	4	0	0
1970	**3rd**	12	13	13	7	0
	4th	2	8	34	45	33
	5th	0	0	0	9	103

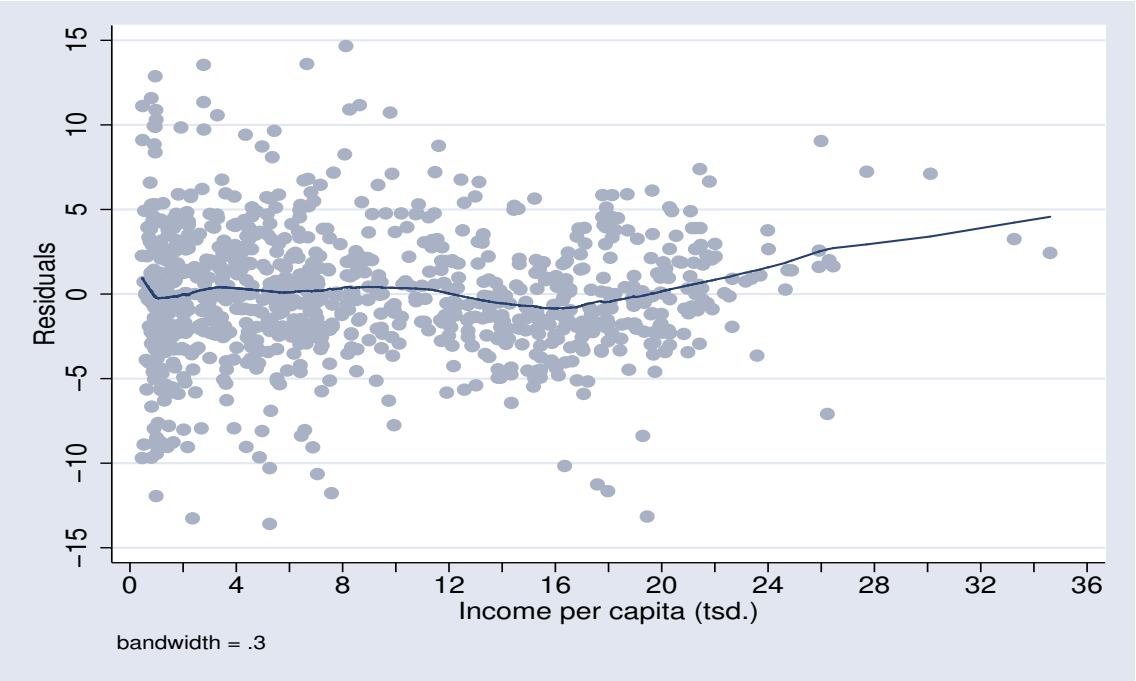
Rows and columns show the number of country quintiles falling into the first to fifth world quintile in 1970 and 1998, respectively.

Figure 1: **Within-Country Inequality Trends**



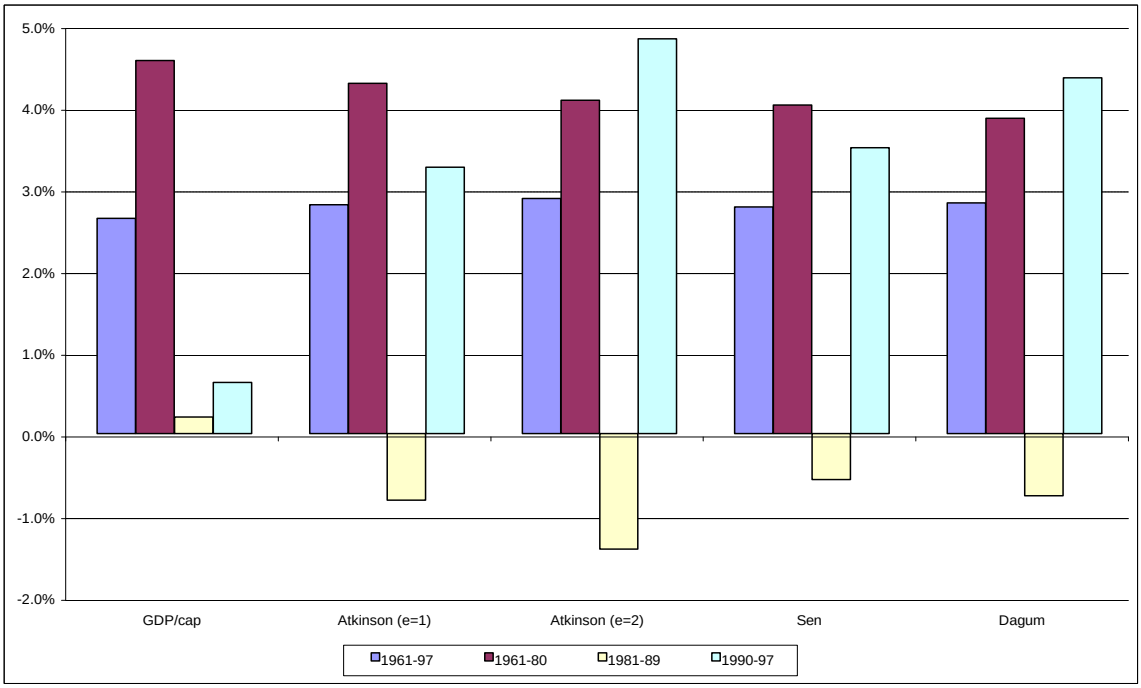
Notes: Time=1 refers to 1960, time=39 to 1998.

Figure 2: **Non-Parametric Estimation of the Kuznets Curve**



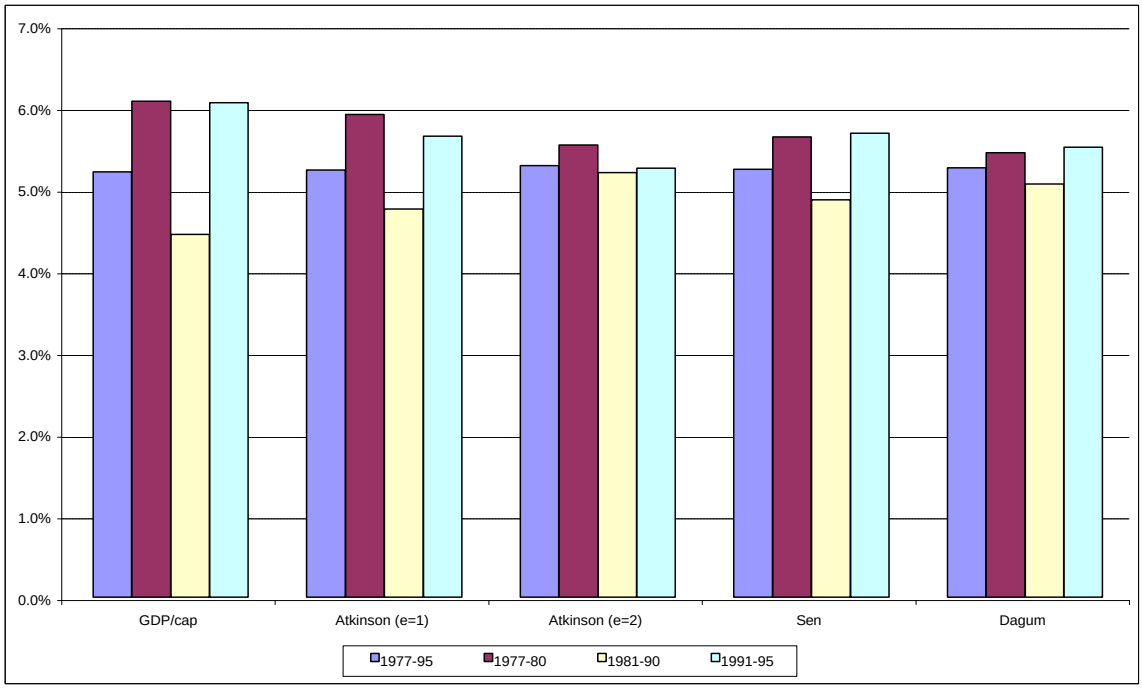
Notes: The income concept applied is real GNP per capita, 1996 prices (Heston, Summers, and Aten, 2002).

Figure 3: **Average Annual Growth of Well-Being in Brazil**



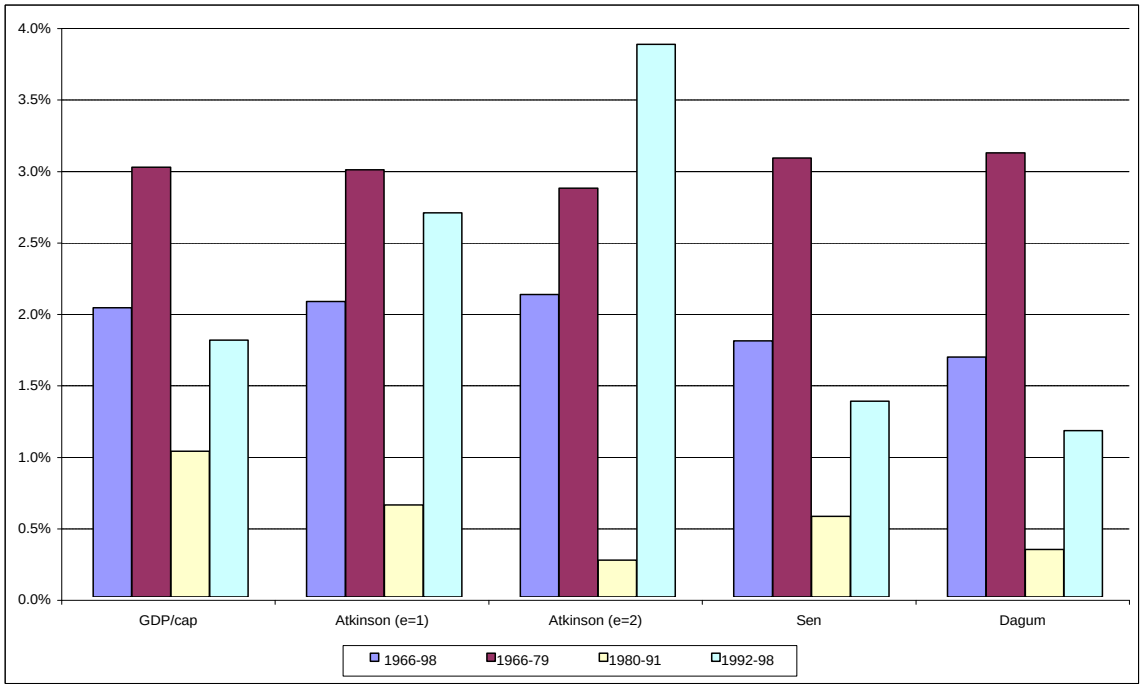
Notes: The income concept used here is GDP per capita at market prices in constant local currency (WDI, 2002). For the Sen and Dagum measures, adjusted Gini coefficients were used.

Figure 4: **Average Annual Growth of Well-Being in Indonesia**



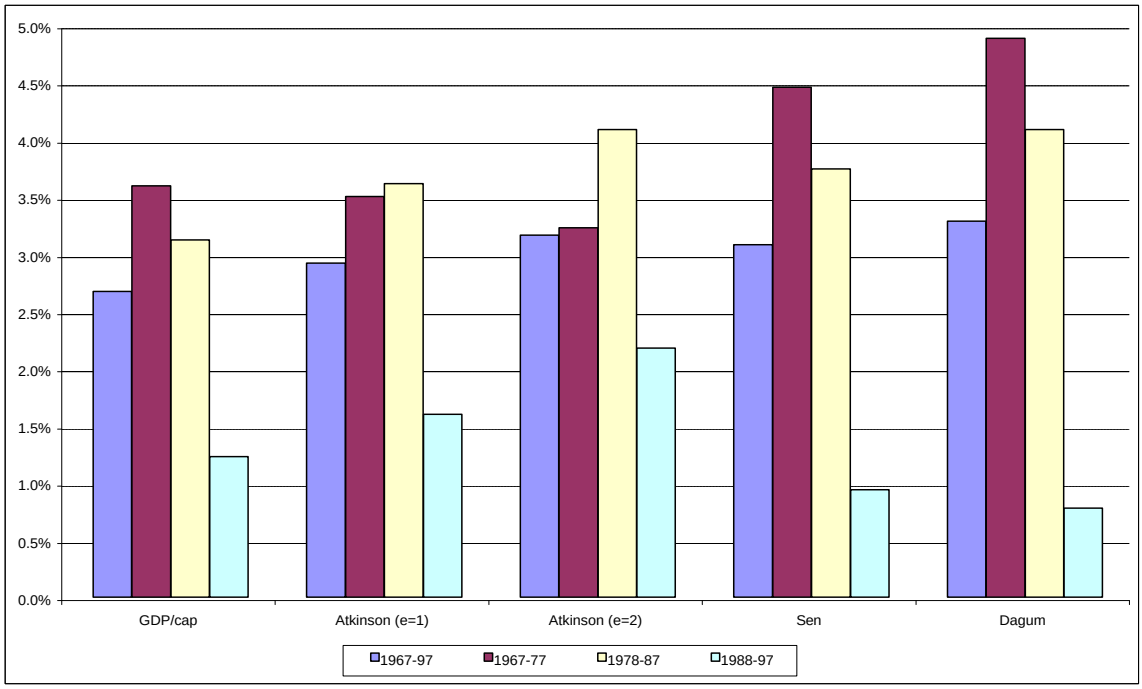
Notes: See Figure 3.

Figure 5: **Average Annual Growth of Well-Being in Canada**



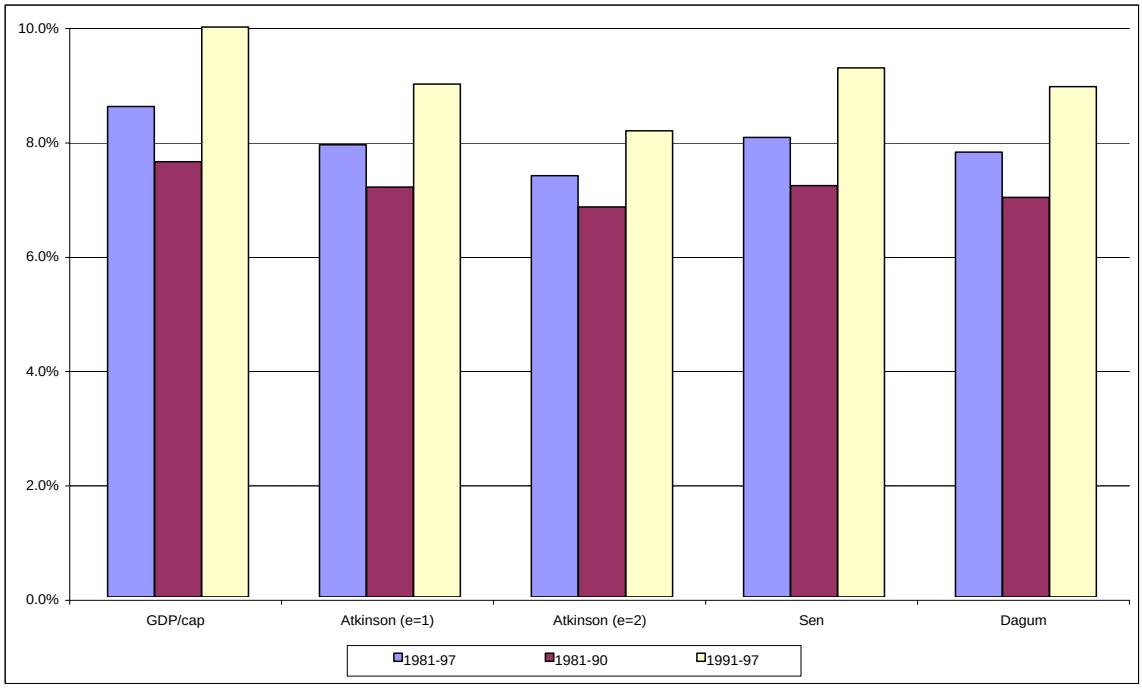
Notes: See Figure 3.

Figure 6: **Average Annual Growth of Well-Being in Finland**



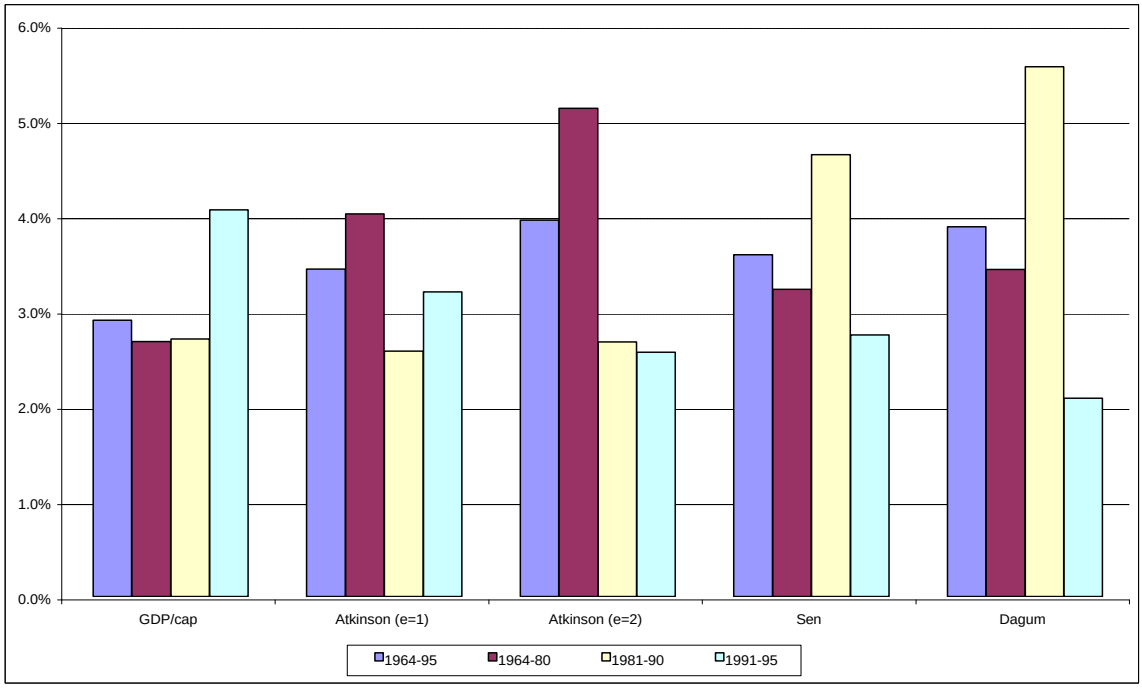
Notes: See Figure 3.

Figure 7: **Average Annual Growth of Well-Being in China**



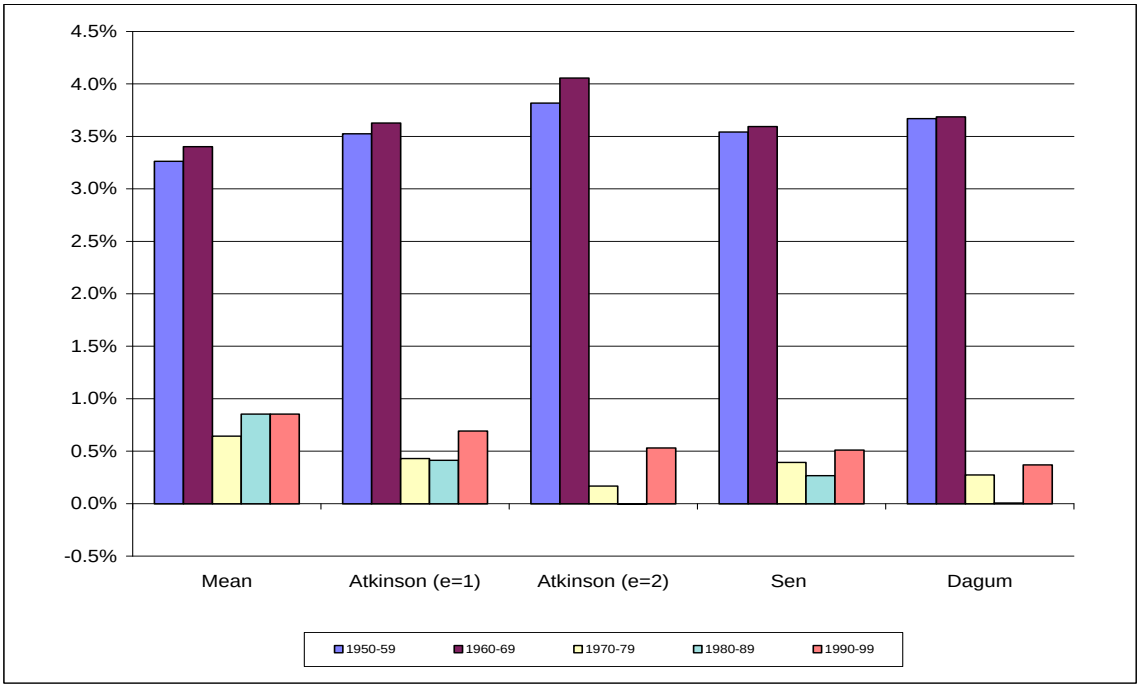
Notes: See Figure 3.

Figure 8: **Average Annual Growth of Well-Being in Sri Lanka**



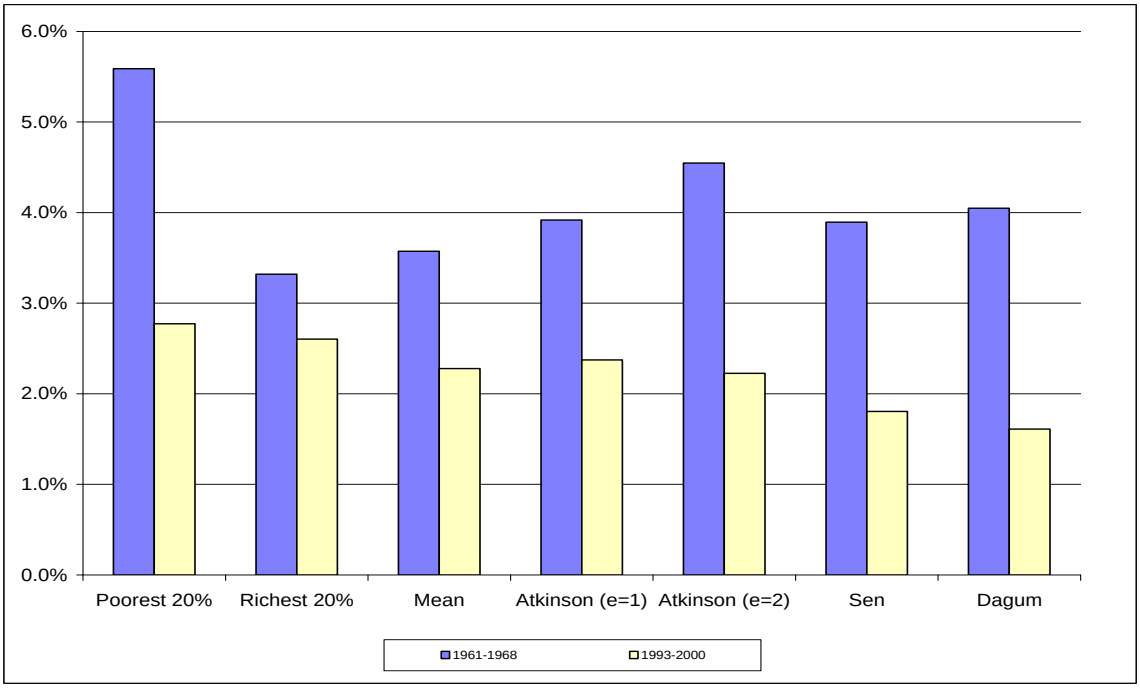
Notes: See Figure 3.

Figure 9: **Average Annual Growth of Well-Being in the US**



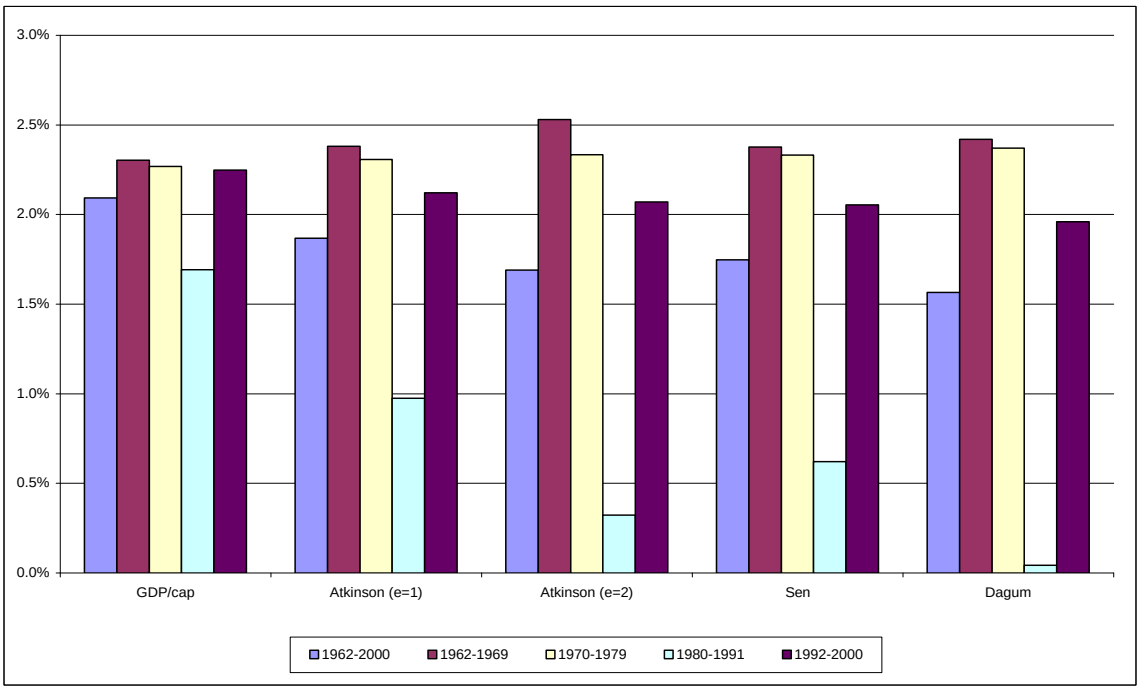
Notes: Calculations are based on U.S. census data (constant 1982 dollars). Mean refers to the mean money income of families.

Figure 10: **'Great Society versus New Economy'**



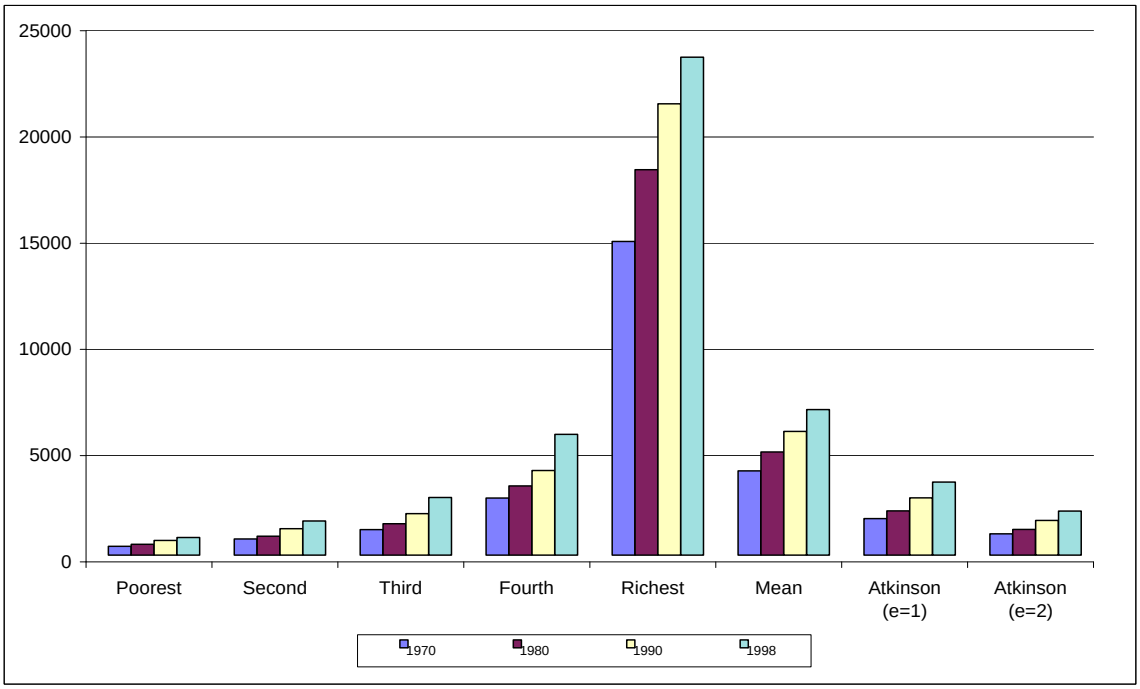
Notes: See Figure 9.

Figure 11: **Average Annual Growth of Well-Being in Great Britain**



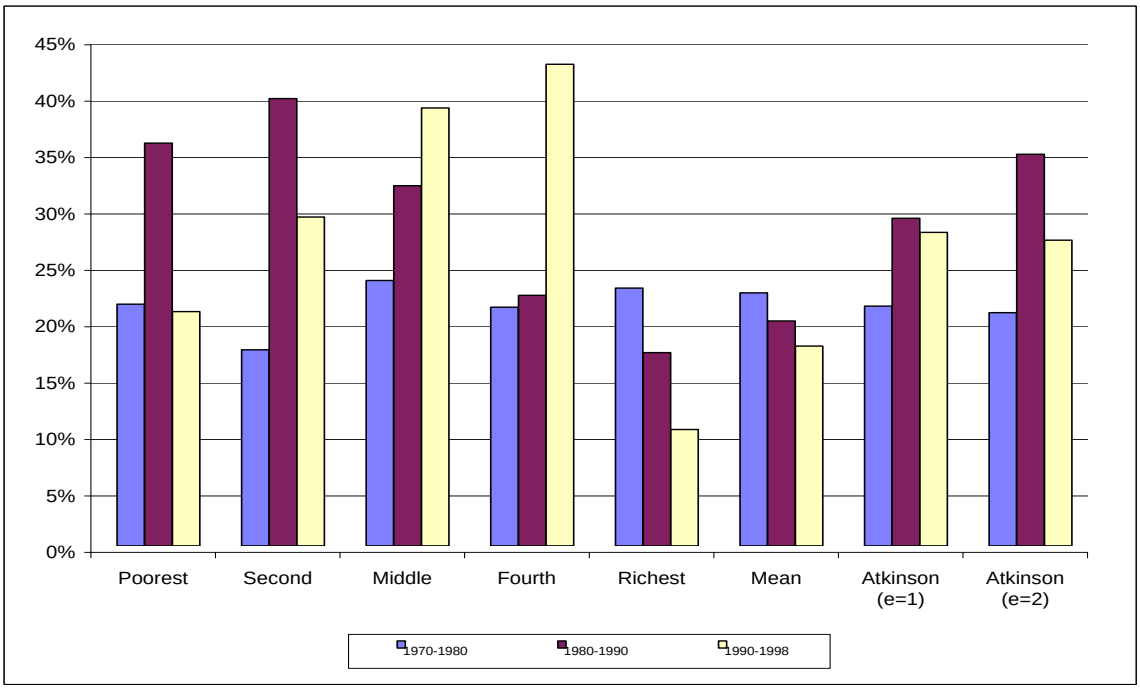
Notes:The income concept used here is GDP per capita at market prices in constant local currency (WDI, 2002). The Ginis and quintile shares are based on the before housing costs series provided by the Institute for Fiscal Studies.

Figure 12: **World Well-Being, 1970-1998**



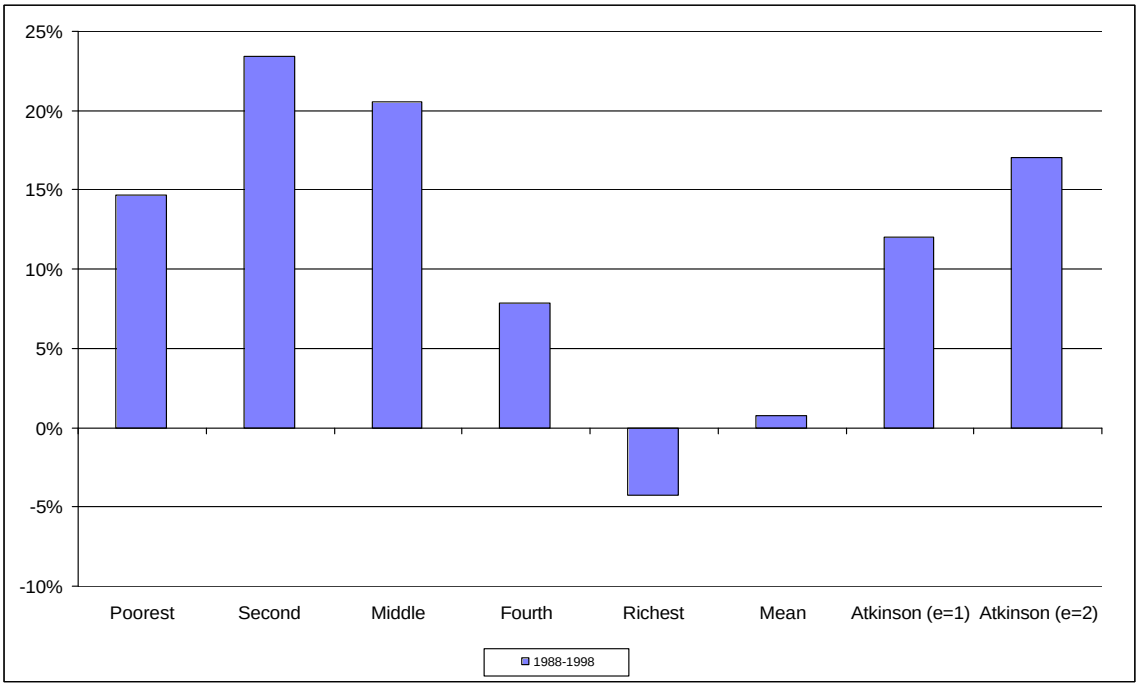
Notes: The first five columns correspond to the five global quintiles. Mean refers to the overall per capita income.

Figure 13: **Growth in World Well-Being, 1970-1998**



Notes: See Figure 12.

Figure 14: **Growth in World Well-Being (Including Transition Economies), 1988-1998**



Notes: See Figure 12.

A Appendix

Table 5: **Income and Inequality Data, 1960-1998**

Country	Code	1960	1970	1980	1990	1998
Algeria	DZA	-	-	-	1988 (38.7; 42.6)	1995 (35.3; 39.1)
Australia	AUS	-	1969 (32.0; 31.0)	1981 (40.0; 38.9)	1990 (41.7; 40.7)	1994 (31.1; 36.5)[b]
Bahamas	BHS	-	-	-	-	1993 (45.3; 44.2)
Bangladesh	BGD	1963 (37.3; 36.3)	1973 (36.0; 34.9)	1981 (39.0; 37.9)	1989 (28.9; 32.7)	1996 (33.6; 37.4)
Barbados	BRB	-	-	1979 (48.9; 47.8)	-	-
Belgium	BEL	-	1979 (28.3; 29.0)	1985 (26.2; 27.0)	1988 (26.6; 27.4)	1997 (25.0; 30.4)[b]
Benin	BEN	1959 (42.0; 42.0)	-	-	-	-
Bolivia	BOL	-	1968 (53.0; 53.0)	-	1990 (42.0; 45.9)	-
Botswana	BWA	-	-	1986 (54.2; 57.0)	-	-
Brazil	BRA	1960 (53.0; 51.9)	1970 (57.6; 56.6)	1980 (57.8; 56.7)	1989 (59.6; 59.6)	1997 (51.7; 49.4)[a]
Bulgaria	BGR	-	-	-	1990 (24.5; 24.5)	1997 (27.3; 31.1)
Burkina Faso	BFA	-	-	-	-	1994 (48.2; 52.0)
Burundi	BDI	-	-	-	-	1992 (33.3; 37.1)
Cambodia	KHM	-	-	-	-	1997 (40.4; 44.2)[a]
Canada	CAN	1965 (31.6; 31.0)	1971 (32.2; 31.6)	1981 (31.8; 31.2)	1990 (27.6; 26.5)	1998 (30.5; 35.9)[b]
Central African Republic	CAF	-	-	-	-	1993 (61.3; 65.1)
Chad	TCD	1958 (35.0; 35.0)	-	-	-	-
Chile	CHL	1968 (45.6; 44.6)	1971 (46.0; 44.9)	-	1990 (56.1; 56.1)[a]	1994 (54.8; 54.8)[a]
China	CHN	-	-	1980 (32.0; 32.0)	1990 (34.6; 34.6)	1997 (39.8; 37.5)[a]
Colombia	COL	1964 (62.0; 62.0)	1970 (52.0; 51.0)	1978 (54.5; 53.4)	1991 (51.3; 51.3)	-
Costa Rica	CRI	1961 (50.0; 48.9)	1971 (44.4; 43.3)	1981 (47.5; 47.5)	1989 (46.1; 46.1)	-
Cote d'Ivoire	CIV	1959 (43.0; 43.0)	-	1985 (41.2; 45.1)	1988 (36.9; 40.7)	1995 (36.7; 40.5)
Denmark	DNK	1963 (37.0; 37.0)	1976 (31.0; 31.8)	1981 (31.0; 29.9)	1987 (33.1; 32.1)	1995 (37.4; 36.7)
Dominican Republic	DOM	-	-	1984 (43.3; 43.3)	1989 (50.5; 51.0)	-
Ecuador	ECU	-	1968 (38.0; 38.0)	-	1988 (43.9; 46.7)[a]	1995 (43.7; 47.5)
Egypt	EGY	-	-	-	1991 (32.0; 35.8)	1995 (28.9; 32.7)
El Salvador	SLV	1965 (53.0; 53.0)	-	1977 (48.4; 47.3)	-	-
Ethiopia	ETH	-	-	1981 (32.4; 37.5)[a]	-	1995 (40.0; 43.8)
Fiji	FJI	-	1968 (46.0; 46.0)	-	-	-
Finland	FIN	1966 (31.8; 37.2)	1977 (30.5; 31.2)	1980 (30.9; 31.6)	1987 (26.1; 26.9)	1997 (23.6; 29.0)
France	FRA	1962 (50.0; 50.0)	1970 (39.8; 39.8)	1979 (34.9; 33.8)	-	1994 (28.8; 34.2)[b]

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Table 5: *continued*

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Gabon	GAB	1960 (64.0; 64.0)	1975 (59.3; 60.1)	1977 (63.2; 64.0)	-	-
The Gambia	GMB	-	-	-	-	1992 (47.8; 51.6)
Ghana	GHA	-	-	-	1989 (36.7; 40.6)	1997 (32.7; 36.5)
Greece	GRC	1957 (38.0; 38.0)	1974 (35.1; 37.9)	1981 (33.3; 36.1)	1988 (35.2; 38.0)	-
Guatemala	GTM	-	-	1979 (49.7; 48.7)	1989 (59.1; 59.1)	-
Guinea	GIN	-	-	-	1991 (46.8; 50.6)	1994 (40.3; 44.1)
Guinea-Bissau	GNB	-	-	-	-	1991 (56.2; 60.0)
Guyana	GUY	1956 (56.2; 55.1)	-	-	-	1993 (40.2; 44.1)
Honduras	HND	-	1968 (61.9; 60.8)	-	1990 (57.4; 57.4)[a]	1992 (52.6; 52.6)
Hong Kong	HKG	-	1971 (40.9; 39.8)	1980 (37.3; 36.2)	1986 (42.0; 40.9)	1991 (45.0; 43.9)
Hungary	HUN	-	1972 (22.8; 24.6)	1982 (21.0; 22.8)	1991 (23.3; 25.2)	1998 (25.3; 27.1)
India	IND	1960 (32.6; 36.4)	1970 (30.4; 34.2)	1983 (31.5; 35.3)	1990 (29.7; 33.5)	1997 (37.8; 41.6)
Indonesia	IDN	-	1976 (34.6; 38.4)	1980 (35.6; 39.5)	1990 (33.1; 36.9)	1995 (34.2; 38.0)
Ireland	IRL	-	1973 (38.7; 39.5)	1980 (35.7; 36.4)	1987 (34.6; 35.4)	-
Italy	ITA	-	1977 (36.3; 37.1)	1980 (34.3; 35.1)	1989 (32.7; 33.5)	1995 (34.2; 39.6)[b]
Jamaica	JAM	1958 (54.3; 53.2)	1975 (44.5; 47.3)	1988 (43.2; 47.0)	1990 (41.8; 45.6)	1996 (36.4; 40.2)
Japan	JPN	1962 (37.2; 36.1)	1970 (35.5; 34.4)	1980 (33.4; 32.3)	-	-
Jordan	JOR	-	-	1980 (40.8; 44.6)	1991 (40.7; 44.5)	1997 (36.4; 40.2)
Kenya	KEN	-	-	-	1992 (54.4; 58.2)	1994 (44.5; 48.3)
Republic of Korea	KOR	1965 (34.3; 33.3)	1970 (33.3; 32.2)	1980 (38.6; 37.6)	1988 (33.6; 32.6)	1993 (31.6; 35.4)
Laos	LAO	-	-	-	-	1992 (30.4; 34.2)
Lesotho	LSO	-	-	-	1987 (56.0; 59.9)	1993 (57.9; 63.0)[a]
Luxembourg	LUX	-	-	-	1985 (27.1; 27.9)	1994 (23.5; 29.4)[b]
Madagascar	MDG	1960 (53.0; 53.0)	-	1980 (46.9; 50.7)[a]	-	1993 (43.4; 47.3)
Malaysia	MYS	-	1970 (50.0; 48.9)	1979 (51.0; 49.9)	1989 (48.4; 48.4)	-
Mali	MLI	-	-	-	1989 (36.5; 41.6)[a]	1994 (50.5; 54.3)
Mauritania	MRT	-	-	-	1988 (42.5; 46.4)	1995 (38.9; 42.7)
Mauritius	MUS	-	-	1980 (45.7; 44.6)	1986 (39.6; 43.5)	1991 (36.7; 40.5)
Mexico	MEX	1963 (53.0; 53.0)	1968 (57.7; 56.6)	1984 (50.6; 50.6)	1989 (55.0; 55.0)	1992 (50.3; 54.1)
Mongolia	MNG	-	-	-	-	1995 (33.2; 37.0)
Morocco	MAR	-	-	1984 (39.2; 43.0)	1991 (39.2; 43.0)	1999 (39.5; 43.3)
Mozambique	MOZ	-	-	-	-	1997 (39.6; 44.7)[a]
Namibia	NAM	-	-	-	-	1993 (74.3; 77.1)[a]
Nepal	NPL	-	1977 (53.0; 53.8)	1984 (30.1; 31.9)	-	1996 (36.7; 40.5)

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Table 5: *continued*

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Netherlands	NLD	1962 (42.0; 42.0)	1975 (28.6; 30.4)	1981 (26.7; 28.5)	1991 (29.4; 31.2)	1994 (25.3; 30.7)[b]
New Zealand	NZL	-	1973 (30.1; 29.0)	1980 (34.8; 33.7)	1989 (36.6; 35.5)	1990 (40.2; 39.2)
Nicaragua	NIC	-	-	-	-	1993 (50.3; 54.1)
Niger	NER	1960 (34.0; 34.0)	-	-	1992 (36.1; 39.9)	1995 (50.6; 54.3)
Nigeria	NGA	1959 (51.0; 51.0)	-	1986 (37.0; 40.9)	1992 (41.2; 45.0)	1997 (50.6; 54.4)
Norway	NOR	1962 (37.5; 38.3)	1973 (37.5; 38.3)	1979 (31.2; 31.9)	1990 (33.3; 34.1)	1995 (23.8; 29.2)[b]
Pakistan	PAK	1969 (30.6; 33.3)	1970 (29.9; 32.7)	1979 (32.3; 35.1)	1988 (31.4; 34.2)	1997 (31.2; 35.0)
Panama	PAN	1969 (48.0; 48.0)	1970 (57.0; 55.9)	1980 (47.5; 47.5)	1989 (56.5; 56.5)	1997 (48.5; 52.3)
Papua New Guinea	PNG	-	-	-	-	1997 (50.9; 54.7)
Paraguay	PRY	-	-	-	1991 (39.7; 39.7)[a]	-
Peru	PER	1961 (61.0; 61.0)	-	1981 (49.3; 49.3)	1986 (42.8; 46.6)	1997 (46.2; 43.9)[a]
Philippines	PHL	1961 (49.7; 48.7)	1971 (49.4; 48.3)	1985 (46.1; 45.0)	1988 (44.7; 43.6)	1997 (46.2; 50.0)
Poland	POL	-	-	1980 (24.9; 24.9)	1990 (26.2; 26.2)	1996 (33.7; 37.5)
Portugal	PRT	-	1973 (40.6; 41.4)	1980 (36.8; 37.6)	1990 (36.8; 37.5)	1991 (35.6; 36.4)
Romania	ROM	-	-	-	1989 (23.4; 24.2)	1994 (28.7; 28.7)
Rwanda	RWA	-	-	1983 (28.9; 32.7)	-	-
Senegal	SEN	1960 (56.0; 56.0)	-	-	1991 (53.8; 57.6)	1994 (41.3; 45.1)
Sierra Leone	SLE	-	1968 (60.8; 59.7)	-	1989 (62.9; 66.7)	-
Singapore	SGP	-	1978 (37.0; 35.9)	1980 (40.7; 39.6)	1988 (41.0; 39.9)	-
South Africa	ZAF	-	-	-	1993 (62.3; 61.2)	1994 (59.3; 63.1)
Spain	ESP	1965 (32.0; 30.9)	1973 (37.1; 36.1)	1980 (34.2; 33.2)	1990 (30.3; 35.7)[b]	1991 (33.0; 31.9)
Sri Lanka	LKA	1963 (47.0; 45.9)	1970 (37.7; 36.7)	1980 (42.0; 40.9)	1990 (30.1; 33.9)	1995 (34.4; 38.2)
Sweden	SWE	1967 (37.9; 36.9)	1975 (31.4; 30.4)	1980 (29.4; 28.3)	1990 (32.5; 33.3)	1995 (22.1; 27.5)[b]
Tanzania	TZA	1964 (54.0; 54.0)	-	-	1991 (59.0; 62.9)	1993 (38.1; 42.0)
Thailand	THA	1962 (41.3; 40.2)	1969 (42.6; 41.6)	1981 (43.1; 42.0)	1990 (48.8; 47.7)	1998 (41.4; 45.2)
Trinidad and Tobago	TTO	1958 (46.0; 44.9)	1971 (51.0; 49.9)	1981 (41.7; 40.7)	-	-
Tunisia	TUN	1965 (42.3; 46.1)	1971 (53.0; 53.0)	1985 (43.4; 47.3)[a]	1990 (40.2; 44.1)	-
Turkey	TUR	1968 (56.0; 54.9)	1973 (51.0; 49.9)	-	1987 (44.1; 43.0)	1994 (41.5; 45.3)
Uganda	UGA	-	-	-	1989 (33.0; 40.4)	1993 (39.2; 43.0)
United Kingdom	GBR	1961 (25.3; 30.7)	1970 (25.1; 20.5)	1980 (24.9; 30.3)	1990 (32.3; 37.7)	1999 (34.5; 39.9)[b]
USA	USA	1960 (34.9; 34.2)	1970 (34.1; 33.4)	1980 (35.2; 34.6)	1990 (37.8; 37.2)	1997 (37.2; 42.6)[b]
Venezuela	VEN	1962 (42.0; 42.0)	1971 (47.7; 47.7)	1981 (42.8; 42.8)	1989 (44.1; 44.1)	-
Vietnam	VNM	-	-	-	1992 (35.7; 39.5)[a]	1998 (36.1; 39.9)[a]
Yemen	YEM	-	-	-	1992 (39.5; 43.3)[a]	1998 (21.8; 25.6)[a]

continued on next page

Table 5: *continued*

Country	**Code**	**1960**	**1970**	**1980**	**1990**	**1998**
Zambia	ZMB	1959 (48.0; 48.0)	-	1976 (51.0; 51.8)	1991 (48.3; 51.1)[a]	1996 (49.8; 53.6)
Zimbabwe	ZWE	-	-	-	1990 (56.8; 60.7)	-

Notes: Original Gini coefficients and adjusted Gini coefficients based on gross income per person are in parentheses.
If not otherwise indicated, data are taken from WIID (2000).
[a]: Data taken from the World Bank (World Bank, 2002a).
[b]: Data are kindly provided by David Jesuit and Tim Smeeding (LIS).

Table 6: **Determinants of Gini Coefficients**

	(1)		**(2)**	
Expenditure	-3.85**	(0.39)	-3.57**	(0.38)
Net income	-1.84**	(0.27)	1.38**	(0.48)
Unknown income	1.24	(1.64)	1.39	(1.61)
Household	1.06**	(0.28)	1.14**	(0.27)
Family	0.64	(0.45)	0.70	(0.44)
Unknown reference unit	-1.24	(1.62)	-1.19	(1.60)
Equivalized	-4.65**	(0.30)	-4.35**	(0.29)
Primary source unknown	1.79**	(0.63)	1.88**	(0.62)
No consistent source	-0.39	(0.25)	-0.44	(0.24)
OECD * Net income	-		-4.64**	(0.56)
Intercept	36.08**	(0.27)	35.92**	(0.26)
N	2033		2033	
R^2	0.21		0.23	

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

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