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Growth, Inequality and Well-Being: Comparisons across Space and Time

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Growth, Inequality, 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 of countries. They also significantly affect the ranking of countries, when compared to rankings based on real per capita incomes. 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 well-being comparisons, 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.

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 due to pragmatic grounds. 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 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, 2002; 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 comparable data on income distribution. {For some applications of these measures for individual countries or groups of countries, see Jenkins (1997); Klasen (1994); Grün and Klasen (2001); Kakwani (1981). 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) applies these measures to intertemporal and global assessments of well-being, the focus here is to undertake international comparisons of well-being for different benchmark years. Due to the use of different years, this analysis will also include an intertemporal component.

The analysis consists of three major parts. In a first step, income inequality-adjusted welfare levels are calculated using various measures for as many countries as possible in 1960, 1970, 1980, 1990, and 1998. In the *international analysis* countries are ranked according to their welfare level in both pure income based measures and inequality-adjusted welfare indicators for these different benchmark years. A comparison of country specific

¹There 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 (2002a); Osberg and Sharpe (2001); World Bank (2002b). None of these, however, are primarily concerned with tackling the distributional issue addressed here.

levels of well-being will demonstrate by how much aggregate welfare in a particular country is reduced once the unequal distribution of its income is taken into account. Looking at the welfare ranks, winners and losers can be detected, i.e. some countries will reach a higher welfare rank than their income rank and vice versa. In a second step, we then examine relative rankings of countries over time. In a third step, we will undertake a thorough sensitivity analysis to examine the robustness of our findings.

It should be pointed out at the start that this study presents results of an exercise that, to some degree, is still speculative. On the theoretical side, we are not aiming to propose definitive measures of well-being. Instead, we merely wish to illustrate how reasonable and empirically supported ways of incorporating inequality in an assessment of well-being will change the impression of well-being across space and time. On the empirical front, the conclusions should be seen as similarly tentative. While today many more data on income inequality across space and time are available, the accuracy and comparability of many of them remain open to question (see Atkinson and Brandolini, 2001; Deininger and Squire, 1996). The robustness of the results will be checked by a thorough sensitivity analysis. None of this can, however, substitute for long consistent time series of internationally standardized and comparable data which are at present not available. Moreover, the international comparisons of inequality are limited by changing sample sizes and irregularly spaced data points on inequality so that it is difficult to assess changes in ranking over time. Despite these short-comings, the analysis generates a number of important and usable findings that appear to be fairly robust to most of the many data problems we encountered.

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. Section 7 examines well-being across time, while Section 8 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.² Ever since it became evident that social choice theory was not yielding acceptable³ 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 generates additional problems. Those are discussed in detail in Sen (1982, 1984) and will only be

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

³Acceptable 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.

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.⁴ 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 poses 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 undervaluation of the non-traded sector in poorer countries. In recent years, the International Comparison Programme (ICP)⁵ has generated purchasing power parity estimates of GDP and GNP based on international prices that try to address these particular short-comings.⁶

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 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

⁴One 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. But this also leads to considerable problems, 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).

⁵The 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). Unfortunately, not all countries participate in the project which had its last round of surveys in 1996, so that PPP had to be estimated based on similar countries. For a discussion, see Heston, Summers, and Aten (2002)

⁶While 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 is revealed below, PPP adjustments can differ in their outcomes as the differences between the World Bank estimates (based on the 1993 ICP) and the Penn World Tables (based on the 1996 ICP) demonstrate.

⁷We abstract from the difficulties associated with the treatment of saving in an indicator of welfare. For a discussion, see Osberg and Sharpe (2002).

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.⁸ Instead, these theoretical and empirical considerations point to concave utility functions, i.e. inequality reduces aggregate welfare as the marginal utility of income among the poor is much higher than among the rich.⁹

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.¹⁰ Similarly, application of Rawlsian principles would also suggest that welfare is higher in societies where inequality is lower (Rawls, 1971).¹¹

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

⁸See 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)

⁹This 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).

¹⁰For example, there appears to be a concave relationship between income and life expectancy, and income and educational achievement. For a discussion, see Klasen (1994).

¹¹In 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).

declining marginal welfare returns of income.¹² 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 savings¹³ 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 inter-temporal assessment of well-being. Other issues to be considered in such an inter-temporal assessment would include the role of savings, longevity, human capital accumulation, population dynamics, depreciation of natural, physical, and human capital.¹⁴ These issues go beyond the scope of this paper which concentrates on a static assessment of well-being at a certain point in time.¹⁵

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,¹⁶ 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

This section describes 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

¹²This 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).

¹³Assuming 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.

¹⁴For a discussion of some of these issues, see for example World Bank (2002b); Berry, Bourguignon, and Morrison (1991)

¹⁵Thus 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.

¹⁶See, 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.

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:

$$W = \mu(1 - I), \quad 0 \leq I \leq 1. \quad (1)$$

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 on the one hand differences with respect to the intensity of 'welfare penalty' that is imposed for inequality. 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 :

$$S = \mu(1 - G). \quad (2)$$

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 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 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).

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

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

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.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*,

¹⁷See 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

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

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:

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

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

Before turning to the data and the results, it is important to briefly discuss the most important differences between the measures.²² Apart from the size of 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

¹⁸This 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).

¹⁹This 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.

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

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

²²For a more extensive discussion of these issues, refer to Atkinson (1970), Blackorby and Donaldson (1978), Sen (1997) and Dagum (1990).

(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 transfers²³, 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.²⁴

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 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.²⁵

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.²⁶ Regarding the size of the penalty for inequality, there is virtual unanimity in the literature that some form of inequality aversion or declining marginal well-being return of income 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

²³The 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.

²⁴For 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.

²⁵For 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).

²⁶See for example Amiel, Creedy, and Hurn (1999); Easterlin (1995); Alesina, Di Tella, and MacCulloch (2002); Kapteyn and van Herwaarden (1980); Wansbeek and Kapteyn (1983)

that studies that are investigating the impact of inequality on subjective well-being find larger inequality aversion than those based on experiments.²⁷ 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. The main sources used for assembling the data set were the Deininger-Squire data (Deininger and Squire, 1996), the Luxembourg Income Study (LIS, 2000), the 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 as well as some OECD countries, Gini coefficients and income shares published by the World Bank's Poverty Monitor (World Bank, 2002a) and directly provided by LIS are added.²⁸ 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.²⁹ With respect to the underlying income concept, inequality data must be based on gross or net income, or on expenditures. Regarding the unit of income recipient, data based on person (or household per capita), or households are chosen. Only for few countries the analysis has 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.³⁰ The data are assembled for 5 benchmark years (1960, 1970, 1980, 1990, 1998). In cases where there is no data point for that particular benchmark year, the closest data point available was chosen, as shown in 1, which also shows the country acronyms used in subsequent tables.³¹ In the case where several Gini coefficients with associated distributions were available for

²⁷See for example Amiel, Creedy, and Hurn (1999); Blanchflower and Oswald (2003); Alesina, Di Tella, and MacCulloch (2002); Stodder (1991); Schwarze and Härpfer (2002); Kapteyn and van Herwaarden (1980).

²⁸Our special thanks go to David Jesuit and Tim Smeeding for kindly providing the most recent data of several OECD countries.

²⁹The quality of income inequality data provided by Deininger and Squire (1996) was already evaluated by them. If the data satisfy a minimum standard, i.e. they are based on household surveys, representative of the entire country, and a comprehensive concept of income (or expenditure) is used, they are included in the so-called 'high quality' set. Atkinson and Brandolini (2001), however, warn of the 'mechanical use' of the data. In WIID, data have been scrutinized one by one once again and the quality of the data was sometimes rated differently. Therefore, it happens that data classified as 'not accepted' and therefore not contained in the quality subset of Deininger-Squire are part of the 'reliable data set' in WIID. The opposite, that data belonging to the quality set but are categorized as 'not reliable' in WIID, is also possible.

³⁰For a discussion of the use of equivalence scales in the context of welfare measurement, please refer to Atkinson, Rainwater, and Smeeding (1995), Deaton (1997), and Ayala, Martinez, and Ruiz-Huerta (2001).

³¹The greatest concessions had to be made for less developed countries like Pakistan, Panama and Chile in 1960, or for Nepal, Indonesia and Singapore in 1970. But also in case of developed countries like Finland in 1960 and 1970, or Belgium and Italy in 1970, the inequality data come from considerably later periods. For 1998, the latest available income distribution estimate has been applied which in a few cases date as far back as 1990 or 1991, but in most cases comes from the period 1993 to 1997. Combining

a particular country at a particular point in time, the observation consistent with the definition of previous or subsequent benchmark years was retained.

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.³² Pursuing this strategy would result in only a small number of countries and not allow a meaningful international analysis. While the main analysis deals 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.

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 product³³ as presented in the national accounts as the income concept used. The calculation of the well-being measures is based on purchasing power adjusted real GNP per capita provided by the Penn World Table (PWT), versions 6.1 Aten:2001. For comparative purposes, 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 GNP per capita figures³⁴ for the years 1980, 1990, and 1998 (WDI, 1999, 2001, 2002) will also be presented.³⁵

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.³⁶ 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.

an income estimate from the exact benchmark year with inequality data that might come from up a few years earlier or later is done under the (implicit) assumption that changes in income distribution between adjacent years are typically smaller than changes in mean income, which is clearly born out by the countries for which we have exact data.

³²Even 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).

³³Gross 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, that differ across countries. For a discussion, see for example Ravallion (2002).

³⁴The 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). All data taken from the World Bank were deflated to 1996 prices using the US GDP deflator (WDI, 2002) as this is the base year in PWT 6.1.

³⁵To compare changes in well-being across time in a particular country, we also use real per capita GNP in local currency units, as reported in the WDI (2002)

³⁶The country acronyms are explained in Table 2.

Well-being, as estimated by the various measures, falls drastically when considering inequality. Using the Atkinson ($\varepsilon = 1$) or Sen measure, well-being falls by about 10-65 per cent, and 70 (Brazil and Mexico) to nearly 80 per cent (Gabon) in the Atkinson ($\varepsilon = 2$) and Dagum measures. Compared to pure income per capita measures, existing inequality leads to major reductions in measured well-being in all the countries considered, but the size of the well-being penalty differs greatly between countries.

As expected from the discussion of inequality-adjusted measures above, there are some differences in the extent of 'penalty' for inequality, depending on the measure used. For example, Pakistan (PAK) gets penalized less by the Atkinson ($\varepsilon = 2$) measure than the Sen measure, while the reverse is the case for the Philippines (PHL). The reason is that in the Philippines the poorest do particularly badly corresponding to 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.

Regarding the ranking of countries, there is a considerable difference between the ranks using exchange rate and PPP, suggesting the presence of over- and undervalued exchange rates. As expected and consistent with the Balassa-Samuelson Theorem, the discrepancy between per capita income evaluated at official exchange rates and PPP is larger among poorer countries, related to the undervaluation of the non-traded sectors. Regarding ranks of countries, no assessment of inequality can dislodge the USA from the highest rank in all measures that use PPP-adjusted income, and nothing can prevent Tanzania (TZA) from being at the bottom of the list for those indicators with data being available. But there are a number of remarkable rank reversals when inequality is progressively being considered. For example, Bangladesh (BGD) and Madagascar (MDG) 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 six and seven ranks ahead.³⁷ A similar reversal occurs, somewhat surprisingly, between Britain (GBR) and Sweden (SWE). 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 observed in today's Sweden was not already present in the 1960s, and the rise of Britain in the distribution-adjusted measures reminds us that Britain was among the most equal countries in Europe in 1960.³⁸

Table 3 shows the 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 (BRA) and Gabon (GAB) are among the countries that lose most: Well-being using the Dagum measure is about 75 per cent below the level it would be if its per capita income were equally distributed. The USA is the best-off countries only when using PPP-adjusted per capita income. As soon as inequality is considered, it is surpassed by Denmark (DNK). In the Atkinson ($\varepsilon = 2$) measure, the US is additionally surpassed by the Netherlands (NLD) and Australia (AUS), suggesting

³⁷Colombia is another country that also falls considerably, once PPP and inequality is considered.

³⁸Gottschalk and Smeeding (2000) also report fairly high income inequality in Sweden in the 1960s, consistent with the results here. In the Luxembourg Income Study (LIS), which begins only in the 1980s, Sweden is found to be considerably more equal than Britain. The reversal occurred due to drastically rising inequality in Britain in the 1980s and a sharp drop in inequality in Sweden in the 1970s. See also the sensitivity analysis in the next chapter and Atkinson and Brandolini (2001); Grün and Klasen (2003).

that the poorest fare much worse in the US than in these two countries, thus attracting the higher penalty in the Atkinson measure. At the bottom Nepal (NPL) has the lowest well-being regardless of the measure used. Some more dramatic reversals in rank occur. Panama falls from number 26 in the exchange rate list to number 39 in Atkinson ($\varepsilon = 2$) measure. Conversely, the Philippines rises from 12 ranks below in the first column to one rank above Panama (PAN) once inequality is considered in the Atkinson ($\varepsilon = 2$) measure. Unequal Brazil trades places with more equal Korea (KOR), and now Sweden maintains its rank when inequality the Gini-based inequality measures are applied, while Britain's fall in the income rank cannot be completely compensated by its still comparatively low inequality.

Table 4 examines 58 countries for 1980. There is one more indicator, PPP adjusted income per capita from the World Bank (WDI, 2002), which is placed alongside the PPP data from the Penn World Tables. The comparison suggests the World Bank's PPP adjustment, which are based on the 1993 ICP, and the PWT's PPP adjustment, which are based on the 1996 ICP, while similar, do not come to the same results many countries. This is particularly pronounced for countries which did not participate in one or both of these exercises and where the incomes were therefore estimated. For example, China (CHN), Indonesia (IDN), Botswana (BWA), Malaysia (MYS), and Venezuela (VEN) look somewhat 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 most Latin American countries (except Venezuela), the Philippines, Korea, and virtually all OECD countries.³⁹ Several rank changes happen as a result of these differences in the PPP adjustments. To facilitate comparisons with the earlier tables, we continue to base our inequality-adjustments on the PWT which is also likely to be more reliable as it is based on a more recent ICP survey.

The inequality-adjusted measures continue to show much lower well-being than the income measures. Brazil, Colombia (COL), and Gabon continue to suffer from the largest reductions in well-being. Due to (comparatively) high income growth and little change in inequality, the US regains its top spot in all PPP-income and inequality-adjusted measures, and Ethiopia is at the bottom in all measures considered. But important rank reversals continue in-between. Near the bottom, Nepal rises above Bangladesh due to much lower inequality in Nepal.⁴⁰ Similarly, Morocco (MAR) far surpasses Botswana (BWA), once inequality is progressively considered and more equal Korea now surpasses much richer but much more unequal Gabon by up to three ranks. Among richer countries, Britain still rises in the ranks when inequality is considered. Unequal Brazil and more equal Costa Rica now trade places.

Table 5 examines the per capita income and well-being in 73 countries in 1990. The differences between the PWT and the World Bank PPP adjustments still exist, but remain consistent in the sense that the differences in assessment in 1990 are largely the same as for

³⁹A small part of the problem might be related to the use of the US GDP deflator to turn current PPP GNI into 1996 prices. But when using the PWT's deflators, the results are very similar and the differences observed above remain. They are likely to be due to differences between the 1993 and the 1996 ICP as well as different adjustment and estimation procedures for countries that did not participate in the one or both of the surveys.

⁴⁰The sharp drop in inequality in Nepal is surprising and might partly be due to data quality issues. See also discussion below

1980, although they are generally smaller now, particularly among OECD countries.⁴¹ The inequality-adjusted well-being measures continue to show levels of well-being up to 75% lower than per capita income. Inequality-adjusted well-being is particularly low in some African (such as South Africa (ZAF), Sierra Leone (SLE), Zimbabwe (ZWE), and Kenya (KEN) as well as Latin American countries (including Brazil, Chile (CHL), Honduras (HDN), Guatemala (GTM), and Mexico (MEX)). Sierra Leone has the dubious distinction of having the lowest income shares in its poorest quintile observed anywhere in the data set so that well-being is reduced by 84% if the Atkinson ($\varepsilon = 2$) measure is applied.

Regarding rank reversals, Brazil and South Africa, two of the world's most unequal countries, get surpassed in the Atkinson measure ($\varepsilon = 2$) by Egypt, a country 17 and 22 ranks, respectively, below in the income ranking with less than half the PPP income per capita. That is to say, South Africa could generate the same level of well-being with less than half of its per capita income, if that income was as evenly distributed as it is in Egypt.

Low levels of income and sizeable income inequality assure that many African countries land at the bottom end in all measures. In contrast, China and all South Asian countries rise in ranks, once inequality is considered. 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 (CAN) and Luxembourg (LUX) and, in the Atkinson ($\varepsilon = 2$) measure, additionally by Belgium (BEL) and Finland (FIN). 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).⁴² Similarly, higher inequality in Britain ensures that the country no longer rises in ranks once inequality is considered.

Table 6 shows the well-being measures for 77 countries in 1998. At the bottom end, we again find mostly African countries. Indonesia still improves in ranks and is now ahead of Peru in the Dagum and Atkinson ($\varepsilon = 2$) measures. Likewise, poorer but more equal Bulgaria (BGR) and richer but more unequal Mexico trade places in those two measures. The same applies to poorer but more equal Turkey and richer but more unequal Chile. At the top end, Luxembourg continues to top the well-being list in all indicators, but the USA is now back to the second or third rank. This is again due to higher income growth in the US (with little change in inequality), compared to other nations. Rising inequality and poorer growth in Canada leads to a fall in ranks for Canada (compared to 1990) and it now surpassed by some other OECD countries in the Atkinson ($\varepsilon = 2$) and Dagum measures. Also, higher inequality in Britain ensures that Britain for the first time falls in

⁴¹As a result, growth among richer countries appears higher when using the PWT than when using the WDIs. This is discussed in detail in Grün and Klasen (2003).

⁴²Please note that these results differ from Ayala, Martinez, and Ruiz-Huerta (2001) who, 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 due to the fact that the present analysis uses the mean (gross) income variable based on national accounts, 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 (PWT versus OECD PPP adjustments), and differences in the measured Gini coefficients.

rank, once inequality is concerned. In contrast, Sweden rises considerably in rank, once inequality is considered. In fact, in Sweden has the smallest inequality recorded here and thus the least reduction in well-being in the inequality-adjusted measures. In the Atkinson ($\varepsilon = 2$) measure, well-being is reduced by only 14%, and in the Dagum measure by only 36%.

It is hard to summarize the many particular findings from this discussion and the much more detailed information contained in the tables. But a few points are worth noting. First, as expected, 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 also persistent and systematic discrepancies between the two sets of available PPP estimates. Secondly, the consideration of the income distribution has a large impact on well-being. Well-being falls by 15-85 per cent once inequality is taken into account. Third, this has a large impact on static comparisons of well-being in the five benchmark years as discussed in detail above. But fourth, it also changes the impression of relative well-being changes between countries over time. The comparison of welfare levels between Indonesia and Peru in 1980-1998 in Figure 1 is a good example. Relying on per capita income measures, Peru is far ahead of Indonesia in all years. But due to higher growth in Indonesia in the 1980s, the gap is getting smaller. But once inequality is considered as well, Peru's welfare level drops sharply and in 1998 Indonesia has not only closed the gap but, when using the Atkinson ($\varepsilon = 2$) measure or the Dagum measure, reached a slightly higher welfare level than Peru. While it is still far from closing the per capita income gap to Peru, it has already closed the well-being gap due to its much lower inequality.⁴³ Figure 2 which examines the welfare levels for the US and Canada between 1970 and 1990 is another good illustration of the impact of growth and inequality changes on the relative rankings of countries. While the negatively sloped curves for the US (from per capita income to inequality-adjusted income levels) 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 the Atkinson ($\varepsilon = 2$) measure and the Dagum measure, to reach a higher welfare level than the US.⁴⁴ This is particularly the case when the Atkinson measure is used suggesting that the well-being comparison is driven by particularly large differences in the income share of the poorest quintile. As shown in the Figure, Canada's well-being advantage would be even larger if an Atkinson measure with a greater penalty (the example here is $\varepsilon = 5$) were used.

A third illustrative example is the comparison between Poland and Brazil from 1980 to 1998. In all three years, Poland and Brazil have similar per capita income levels. But due to the much higher inequality in Brazil, well-being is dramatically lower in all three years. This is particularly pronounced in 1990 where the gap in inequality between the two countries is particularly sizable. In 1998, the situation changes a bit. While Brazil had reduced its inequality a bit, it increased considerably in Poland, so that the gap in the inequality adjusted measures is considerably smaller now.

⁴³These figures already include the impact of the Asian financial crisis on economic growth in Indonesia which was sharply negative in 1997 and 1998; if Indonesia returns to its previous high growth, it will soon surpass Peru in per capita income, and, if it is able to maintain its relatively low inequality, it will far surpass it in well-being terms.

⁴⁴Interestingly, Canada, despite its smaller income, also regularly surpasses the US in the Human Development Index calculated by the United Nations Development Programme UNDP (2002b).

While Poland is a transition country where both per capita income and inequality increased in the 1990s, there are many more transition countries where per capita income *shrank* and inequality increased.⁴⁵ In Figure 4 the well-being implications are powerfully demonstrated.⁴⁶ In 1990, Kyrgyzstan and Ukraine both had higher per capita incomes and lower inequality than Egypt, thus having much higher levels of (inequality-adjusted) well-being. In 1998, inequality has increased sharply to levels higher than Egypt's, and income growth was negative over the decade, while Egypt experienced moderate income growth and maintained its inequality level. As a result, per capita incomes in Egypt in 1998 is about the same as in Ukraine and substantially higher than in Kyrgyzstan. Once inequality is considered, well-being is now significantly higher in Egypt than in Ukraine and the well-being gap to Kyrgyzstan is much larger than the income gap. Looking at the income decline in transition countries thus seriously understates the comparative performance of this group of countries. In well-being terms, the 1990s were even more of a catastrophe for many transition countries than suggested by per capita income.

The results from this section clearly demonstrate the large impact our inequality-adjusted measures have on our impression of absolute levels of well-being in countries, the comparative ranking of countries at particular points in time, and the impression of the change in rankings over time. Clearly, considering inequality matters for international assessments of well-being.

6 Sensitivity Analysis

The robustness of the results is checked with the help of two different approaches. First, we simply replace the data on income distribution used in the original analysis by alternative data. Those are either based on different income concepts and/or reference units or come from a different data source.⁴⁷ For countries with such alternatives available, we replace the Gini coefficients and income shares, calculate the measures, rank the countries again and compare the results with those obtained from the original 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. In a few cases, more dramatic changes occur although it is unclear to what extent these are due to data errors.⁴⁸

⁴⁵This issue, and its well-being implications, has been discussed in detail by Grün and Klasen (2001).

⁴⁶As the PWT have no income data for many transition countries, this figure is based on the WDI data.

⁴⁷In addition, this replacing approach is restricted to alternative data which are based on the same year (plus/minus one year) as used in the main analysis. The source of alternative data is given in Table 7.

⁴⁸An interesting example is Jamaica in 1960. 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 from the alternative source are very different, 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 considerably. The Atkinson measures responds to these dramatic changes with notably lower ranks. It is quite implausible that a very similar Gini can produce such great differences in income shares, suggesting a data error. We nevertheless used the data

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 differences may contribute to the existing differences in rank⁴⁹.

Mexico in 1990 is another example of the range 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, the 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. Despite these particular anomalies and differences, the overall impression from Table 7 is one of great stability in the ranks when alternative inequality data are used.

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. The sample is expanded by adding 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 enhance 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), dummy variables for Deininger-Squire data labelled as 'cs' (no consistent source) and 'ps' (primary source unknown) are also included.

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.⁵⁰ 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).

As a next step, the Gini coefficients are adjusted according to the regression results from the first estimation. All the Gini coefficients are thereby based on the omitted categories, i.e. gross income per person. This way we hope to have dealt with the most

as both the 'original' source (Deininger and Squire, 1996) and WIID classified them as reliable. Clearly, more thorough analysis of the consistency of Gini coefficients and income shares in the two inequality data bases might be necessary.

⁴⁹See Atkinson and Brandolini (2001) for a discussion of related issues

⁵⁰The somewhat surprising result about household-based Gini coefficients was also found by Lundberg and Squire (2001). Note that the regressions here have considerably higher explanatory power (as measured by the R-squared) as the ones used by Dollar and Kraay (2002) and Lundberg and Squire (2001). We do not make a similar adjustment for quintile shares where a similar regression was much more poorly determined. As a result, we are only able to apply this sensitivity analysis to the Gini-based measures.

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. Only in 1990 are there more significant changes in rank. Moreover, all of the dramatic rank reversals and changes discussed earlier still hold.

These sensitivity analyses suggest that few of the basic results on the large absolute impact of income inequality and the change in ranks as a result of it are seriously affected by using different data sets or addressing the inconsistencies in the underlying income concept and reference unit. However, quite a number of individual rankings are affected so that analyses focussing on smaller differences, particularly among OECD countries, should be based upon more consistent data sources rather than rely on the somewhat heterogeneous information used here (e.g. Ayala, Martinez, and Ruiz-Huerta, 2001).

7 Concluding Remarks

Most theories of well-being as well as an overwhelming array of experimental and empirical literature document the well-being penalty imposed by inequality. Nevertheless, this insight is rarely used to adjust international and intertemporal comparisons of well-being. In this paper we combine the insights from this literature with newly available internationally (roughly) comparable data of per capita income and its distribution to demonstrate the impact of considering inequality in an assessment of well-being. The impression of well-being derived from inequality-adjusted measures drastically differs from the one obtained when looking at the mean income alone.

In particular, due to sizable inequality existing in most countries, our measures show dramatically reduced levels of well-being, compared to per capita income. Due to great differences in inequality between countries, incorporating inequality has a sizable impact on the ranking of countries in terms of their average well-being. Countries like Brazil, Mexico, Chile, but also the USA have considerably lower levels of well-being than suggested by per capita income. In contrast, countries such as Indonesia, Bangladesh, Finland, Sweden and Belgium are examples of reaching a higher well-being rank than their pure income rank. Moreover, different trends in inequality affect the ranking of countries over time. In particular, the progressive worsening of Britain in the inequality-adjusted ranks is not just due to a falling behind in per capita incomes, but also due to worsening inequality, compared to other industrialized countries. More dramatically, inequality-adjusted well-being in many transition countries in the 1990s has collapsed to levels of lower middle-income countries and sometimes even low-income countries due to the combination of drastically falling inequality and greatly increased inequality.

Our sensitivity analysis suggests that the results are quite robust to using different data sources and to dealing with some of the known inconsistencies in the inequality data. Nevertheless, there remains much room for improvement in generating more consistent, comparable, and timely inequality data that will allow more accurate and robust assessments of well-being across space and time.

Table 1: Income and Inequality Data, 1960-1998

Country	Code	1960	1970	1980	1990	1998
Algeria	DZA	-	-	-	1988 (38.7)	1995 (35.3)
Australia	AUS	-	1969 (32.0)	1981 (40.0)	1990 (41.7)	1994 (31.1) ^b
Bahamas	BHS	-	-	-	-	1993 (45.3)
Bangladesh	BGD	1963 (37.3)	1973 (36.0)	1981 (39.0)	1989 (28.9)	1996 (33.6)
Barbados	BRB	-	-	1979 (48.9)	-	-
Belgium	BEL	-	1979 (28.3)	1985 (26.2)	1988 (26.6)	1997 (25.0) ^b
Benin	BEN	1959 (42.0)	-	-	-	-
Bolivia	BOL	-	1968 (53.0)	-	1990 (42.0)	-
Botswana	BWA	-	-	1986 (54.2)	-	-
Brazil	BRA	1960 (53.0)	1970 (57.6)	1980 (57.8)	1989 (59.6)	1997 (51.7) ^a
Bulgaria	BGR	-	-	-	1990 (24.5)	1997 (27.3)
Burkina Faso	BFA	-	-	-	-	1994 (48.2)
Burundi	BDI	-	-	-	-	1992 (33.3)
Cambodia	KHM	-	-	-	-	1997 (40.4) ^a
Canada	CAN	1965 (31.6)	1971 (32.2)	1981 (31.8)	1990 (27.6)	1998 (30.5) ^b
Central African Republic	CAF	-	-	-	-	1993 (61.3)
Chad	TCD	1958 (35.0)	-	-	-	-
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
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)	-
Cote d'Ivoire	CIV	1959 (43.0)	-	1985 (41.2)	1988 (36.9)	1995 (36.7)
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)	-
Ecuador	ECU	-	1968 (38.0)	-	1988 (43.9) ^a	1995 (43.7)
Egypt	EGY	-	-	-	1991 (32.0)	1995 (28.9)
El Salvador	SLV	1965 (53.0)	-	1977 (48.4)	-	-
Ethiopia	ETH	-	-	1981 (32.4) ^a	-	1995 (40.0)
Fiji	FJI	-	1968 (46.0)	-	-	-
Finland	FIN	1966 (31.8)	1977 (30.5)	1980 (30.9)	1987 (26.1)	1997 (23.6)
France	FRA	1962 (50.0)	1970 (39.8)	1979 (34.9)	-	1994 (28.8) ^b
Gabon	GAB	1960 (64.0)	1975 (59.3)	1977 (63.2)	-	-
The Gambia	GMB	-	-	-	-	1992 (47.8)
Ghana	GHA	-	-	-	1989 (36.7)	1997 (32.7)

continued on next page

Table 1: *continued*

Country	Code	1960	1970	1980	1990	1998
Greece	GRC	1957 (38.0)	1974 (35.1)	1981 (33.3)	1988 (35.2)	-
Guatemala	GTM	-	-	1979 (49.7)	1989 (59.1)	-
Guinea	GIN	-	-	-	1991 (46.8)	1994 (40.3)
Guinea-Bissau	GNB	-	-	-	-	1991 (56.2)
Guyana	GUY	1956 (56.2)	-	-	-	1993 (40.2)
Honduras	HND	-	1968 (61.9)	-	1990 (57.4) ^a	1992 (52.6)
Hong Kong	HKG	-	1971 (40.9)	1980 (37.3)	1986 (42.0)	1991 (45.0)
Hungary	HUN	-	1972 (22.8)	1982 (21.0)	1991 (23.3)	1998 (25.3)
India	IND	1960 (32.6)	1970 (30.4)	1983 (31.5)	1990 (29.7)	1997 (37.8)
Indonesia	IDN	-	1976 (34.6)	1980 (35.6)	1990 (33.1)	1995 (34.2)
Ireland	IRL	-	1973 (38.7)	1980 (35.7)	1987 (34.6)	-
Italy	ITA	-	1977 (36.3)	1980 (34.3)	1989 (32.7)	1995 (34.2) ^b
Jamaica	JAM	1958 (54.3)	1975 (44.5)	1988 (43.2)	1990 (41.8)	1996 (36.4)
Japan	JPN	1962 (37.2)	1970 (35.5)	1980 (33.4)	-	-
Jordan	JOR	-	-	1980 (40.8)	1991 (40.7)	1997 (36.4)
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)
Lesotho	LSO	-	-	-	1987 (56.0)	1993 (57.9) ^a
Luxembourg	LUX	-	-	-	1985 (27.1)	1994 (23.5) ^b
Madagascar	MDG	1960 (53.0)	-	1980 (46.9) ^a	-	1993 (43.4)
Malaysia	MYS	-	1970 (50.0)	1979 (51.0)	1989 (48.4)	-
Mali	MLI	-	-	-	1989 (36.5) ^a	1994 (50.5)
Mauritania	MRT	-	-	-	1988 (42.5)	1995 (38.9)
Mauritius	MUS	-	-	1980 (45.7)	1986 (39.6)	1991 (36.7)
Mexico	MEX	1963 (53.0)	1968 (57.7)	1984 (50.6)	1989 (55.0)	1992 (50.3)
Mongolia	MNG	-	-	-	-	1995 (33.2)
Morocco	MAR	-	-	1984 (39.2)	1991 (39.2)	1999 (39.5)
Mozambique	MOZ	-	-	-	-	1997 (39.6) ^a
Namibia	NAM	-	-	-	-	1993 (74.3) ^a
Nepal	NPL	-	1977 (53.0)	1984 (30.1)	-	1996 (36.7)
Netherlands	NLD	1962 (42.0)	1975 (28.6)	1981 (26.7)	1991 (29.4)	1994 (25.3) ^b
New Zealand	NZL	-	1973 (30.1)	1980 (34.8)	1989 (36.6)	1990 (40.2)
Nicaragua	NIC	-	-	-	-	1993 (50.3)

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Table 1: *continued*

Country	Code	1960	1970	1980	1990	1998
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)
Norway	NOR	1962 (37.5)	1973 (37.5)	1979 (31.2)	1990 (33.3)	1995 (23.8) ^b
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)
Papua New Guinea	PNG	-	-	-	-	1997 (50.9)
Paraguay	PRY	-	-	-	1991 (39.7) ^a	-
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)
Poland	POL	-	-	1980 (24.9)	1990 (26.2)	1996 (33.7)
Portugal	PRT	-	1973 (40.6)	1980 (36.8)	1990 (36.8)	1991 (35.6)
Romania	ROM	-	-	-	1989 (23.4)	1994 (28.7)
Rwanda	RWA	-	-	1983 (28.9)	-	-
Senegal	SEN	1960 (56.0)	-	-	1991 (53.8)	1994 (41.3)
Sierra Leone	SLE	-	1968 (60.8)	-	1989 (62.9)	-
Singapore	SGP	-	1978 (37.0)	1980 (40.7)	1988 (41.0)	-
South Africa	ZAF	-	-	-	1993 (62.3)	1994 (59.3)
Spain	ESP	1965 (32.0)	1973 (37.1)	1980 (34.2)	1990 (30.3) ^b	1991 (33.0)
Sri Lanka	LKA	1963 (47.0)	1970 (37.7)	1980 (42.0)	1990 (30.1)	1995 (34.4)
Sweden	SWE	1967 (37.9)	1975 (31.4)	1980 (29.4)	1990 (29.0)	1995 (22.1) ^b
Tanzania	TZA	1964 (54.0)	-	-	1991 (59.0)	1993 (38.1)
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)
Uganda	UGA	-	-	-	1989 (33.0)	1993 (39.2)
United Kingdom	GBR	1961 (25.3)	1970 (25.1)	1980 (24.9)	1990 (32.3)	1999 (34.5) ^b
USA	USA	1960 (34.9)	1970 (34.1)	1980 (35.2)	1990 (37.8)	1997 (37.2) ^b
Venezuela	VEN	1962 (42.0)	1971 (47.7)	1981 (42.8)	1989 (44.1)	-
Vietnam	VNM	-	-	-	1992 (35.7) ^a	1998 (36.1) ^a
Yemen	YEM	-	-	-	1992 (39.5) ^a	1998 (21.8) ^a
Zambia	ZMB	1959 (48.0)	-	1976 (51.0)	1991 (48.3) ^a	1996 (49.8)
Zimbabwe	ZWE	-	-	-	1990 (56.8)	-

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Table 1: *continued*

Country	Code	1960	1970	1980	1990	1998
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Notes: Gini coefficients 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 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	TZA	TZA	TZA
42	IND	163	PAK	PAK	PAK	NGA
41	PAK	187	IND	IND	NGA	PAK
40	NGA	217	NGA	NGA	MDG	MDG
39	BGD	222	BGD	ZMB	IND	IND
38	LKA	271	BEN	MDG	ZMB	ZMB
37	TCD	292	ZMB	DHM	SEN	DHM
36	BEN	357	THA	THA	THA	THA
35	MDG	374	MDG	BGD	LKA	LKA
34	NER	413	TCD	LKA	DHM	BGD
33	THA	459	LKA	GUY	BGD	GUY
32	CIV	601	KOR	TCD	COL	SEN
31	GUY	620	NER	SEN	GAB	TCD
30	ZMB	627	CIV	CIV	TCD	COL
29	SEN ^d	650	GUY	COL	GUY	GAB
28	PHL	715	SEN	KOR	BRA	CIV
27	TUN ^a	791	PHL	PHL	PHL	PHL
26	COL ^b	1239	TUN	GAB	KOR	BRA
25	SLV	1328	BRA	NER	TUR	KOR
24	KOR	1347	PAN	BRA	CIV	PER
23	JAM	1395	COL	TUN	PER	TUR
22	TTO	1466	JAM	TUR	PER	JAM
21	PAN	1590	TUR	PER	TUN	NER
20	MEX	1621	GAB	JAM	PAN	TUN
19	TUR ^d	1637	PER	PAN	JAM	PAN

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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)
18	PER	1857	SLV	SLV	SLV	SLV
17	BRA	1887	MEX	CRI	MEX	CRI
16	GAB	1911	CRI	MEX	TTO	MEX
15	CRI	2010	CHL	CHL	CRI	CHL
14	CHL	2209	TTO	TTO	CHL	TTO
13	GRC	3537	GRC	GRC	FRA	GRC
12	VEN ^c	3896	JPN	JPN	JPN	JPN
11	ESP	4740	ESP	ESP	GRC	ESP
10	JPN	8372	FRA	FRA	ESP	FRA
9	GBR	9752	VEN	VEN	VEN	VEN
8	FIN	10087	FIN	NOR	NLD	NOR
7	FRA	10857	NOR	FIN	SWE	NLD
6	NOR	11363	NLD	NLD	NOR	FIN
5	CAN	11795	GBR	SWE	FIN	SWE
4	NLD	12416	CAN	DNK	DNK	DNK
3	USA	13579	SWE	CAN	USA	CAN
2	SWE	13600	DNK	GBR	CAN	GBR
1	DNK	15458	USA	USA	GBR	USA

Notes: All rankings are based on the absolute values of the well-being indicator.

The last four columns present the ratios of the respective inequality-adjusted income to GNP per capita, PPP, shown in the third column.

*: 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	NPL	160	NPL	NPL	NPL	NPL
47	IND	215	SLE	SLE	SLE	SLE
46	BGD	261	PAK	PAK	HND	HND
45	SLE	281	HND	HND	PAK	PAK
44	PAK	285	BGD	BGD	BGD	BGD
43	IDN	306	IDN	IDN	IDN	IDN
42	LKA	332	IND	IND	IND	IND
41	HND	577	LKA	LKA	LKA	LKA
40	THA	776	THA	THA	THA	THA
39	BOL	845	TUN	TUN	PAN	TUN
38	PHL	846	PHL	PHL	PHL	PHL
37	ECU	906	TUN	BOL	TUN	BOL
36	TUN	980	BOL	ECU	BOL	MYS
35	MYS	1384	KOR	MYS	MYS	BRA
34	COL	1415	MYS	COL	BRA	COL
33	FJI	1685	COL	BRA	ECU	ECU
32	TUR	1703	FJI	PAN	FJI	PAN
31	JAM	1911	BRA	FJI	TUR	TUR
30	TTO	2029	TUR	TUR	COL	FJI
29	KOR	2214	JAM	KOR	TTO	KOR
28	MEX	2309	PAN	JAM	JAM	JAM
27	CRI	2417	CRI	CRI	MEX	MEX
26	PAN	2437	CHL	MEX	KOR	CRI
25	BRA	2600	HUN	CHL	CHL	GAB
24	CHL	2670	SGP	GAB	CRI	CHL
23	HUN	2703	MEX	TTO	GAB	TTO
22	GAB	3446	TTO	SGP	SGP	SGP
21	VEN	4196	PRT	PRT	HKG	PRT
20	PRT	5166	GAB	HKG	PRT	HKG
19	SGP	5589	HKG	HUN	HUN	HUN
18	HKG	6065	IRL	IRL	IRL	IRL
17	GRC	6984	GRC	VEN	VEN	VEN

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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	ESP	9074	GRC	64.9
15	ESP	8677	VEN	10087	ESP	62.9
14	ITA	11064	NOR	11071	NOR	62.5
13	GBR	12151	FIN	11320	ITA	63.7
12	CAN	12522	ITA	11356	JPN	64.5
11	NZL	12648	JPN	11454	FRA	60.2
10	AUS	13698	GBR	12172	FIN	69.6
9	FIN	15389	BEL	12302	BEL	71.8
8	NOR	15840	FRA	12360	CAN	74.9
7	BEL	16714	NLD	13488	NZL	67.8
6	FRA	16774	NZL	13570	CAN	70.0
5	USA	17443	CAN	13888	NLD	71.4
4	NLD	17890	AUS	14691	SWE	68.0
3	SWE	19874	SWE	14873	AUS	68.6
2	JPN	20370	DNK	16053	USA	65.9
1	DNK	22190	USA	16290	DNK	69.0

Notes: For definition of columns, see 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)
58	ETH ^a	119	COL	n.a.	ETH	67.6	ETH
57	NPL	154	POL	n.a.	ZMB	49.0	ZMB
56	CHN	170	ETH ^a	721	MDG	53.2	MDG
55	BGD	227	CHN	809	BGD	61.0	BGD
54	IND	234	NPL	862	NPL	69.9	NPL
53	NGA	253	BGD	985	CHN	68.0	NGA
52	PAK	325	NGA	1020	NGA	63.0	CHN
51	RWA	328	ZMB	1143	PAK	67.7	PAK
50	MDG	345	IND	1178	RWA	71.1	IND

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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)					
49	LKA	439	MDG	1178	IND	86.9	IND	68.5	IND	76.6	RWA	55.2
48	IDN	493	PAK	1178	LKA	84.0	LKA	58.0	LKA	71.4	LKA	40.8
47	ZMB	553	RWA	1266	IDN	89.1	IDN	64.4	LKA	78.6	IDN	47.5
46	CIV	1004	IDN	1460	CIV	77.4	CIV	58.8	THA	52.4	BWA	29.7
45	MAR	1111	LKA	1864	THA	71.8	BWA	45.8	BWA	43.1	CIV	41.6
44	THA	1135	CIV	2163	BWA	63.1	THA	56.9	CIV	61.1	THA	39.8
43	PHL	1187	THA	2568	DOM	75.7	DOM	56.7	DOM	58.6	DOM	39.6
42	DOM	1309	MAR	2867	MAR	80.4	PHL	53.9	COL	40.7	PHL	36.9
41	JAM	1482	JAM	3078	JAM	75.8	MAR	60.8	PHL	56.1	JAM	39.7
40	BWA	1515	BWA	3113	PHL	73.0	JAM	56.8	JAM	59.0	COL	29.4
39	SLV	1589	DOM	3763	COL	62.2	COL	45.5	MAR	66.3	MAR	43.7
38	TUN	1613	GTM	3957	GTM	69.6	GTM	50.3	GTM	51.5	GTM	33.6
37	GTM	1620	MYS	4080	SLV	69.9	SLV	51.6	SLV	52.0	SLV	34.8
36	MUS	1802	SLV	4115	JOR	74.7	MYS	49.0	MYS	46.2	MYS	32.5
35	JOR	1880	MUS	4133	MYS	66.6	PER	50.7	PER	36.8	PER	33.9
34	COL	1957	TUN	4133	PER	67.8	TUN	56.6	CRI	44.9	BRA	26.8
33	MYS	2312	PHL	4326	MYS	75.6	JOR	59.2	PAN	50.0	TUN	39.4
32	PAN	2459	JOR	4537	KOR	69.7	PAN	52.5	JOR	58.8	PAN	35.6
31	PER	2490	PAN	4801	PAN	67.8	BRA	42.2	PER	52.4	JOR	42.0
30	POL	2967	PER	5170	CRI	58.0	CRI	52.5	TUN	59.2	GAB	22.6
29	CRI	3044	KOR	5293	KOR	77.8	KOR	61.4	GAB	33.7	CRI	35.6
28	MEX	3245	GAB	6454	BRA	53.6	GAB	36.8	KOR	60.0	MUS	37.3
27	KOR	3760	CRI	6472	POL	82.9	MUS	54.3	BRB	35.8	KOR	44.3
26	VEN	4075	BRA	6876	MEX	67.2	MEX	49.4	MEX	47.9	MEX	32.8
25	HUN	4210	VEN	7105	VEN	75.2	VEN	57.2	MUS	68.4	VEN	40.0
24	BRA	4512	TTO	7562	POL	91.4	POL	75.1	TTO	48.6	BRB	34.4
23	GAB	5057	MEX	7738	BRB	63.3	BRB	51.1	VEN	57.3	TTO	41.1
22	TTO	5065	HUN	9497	TTO	72.4	TTO	58.3	POL	83.6	POL	60.2
21	BRB	6909	SGP	9971	PRT	80.4	PRT	63.2	PRT	63.6	PRT	46.2
20	PRT	7343	PRT	10024	HUN	93.9	HUN	79.0	HUN	59.1	SGP	42.2
19	GRC	10122	IRL	10253	IRL	77.8	IRL	64.4	IRL	64.7	IRL	47.4
18	SGP	10886	ESP	12152	SGP	79.1	SGP	59.3	SGP	88.4	HUN	65.3

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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)	
17	IRL	11068	HKG	12205	ESP	11476	ESP	49.0
16	ESP	11174	BRB	12539	HKG	12265	HKG	45.7
15	HKG	11515	GRC	14087	GRC	12578	GRC	50.0
14	NZL	13966	NZL	14966	NZL	13921	NZL	48.4
13	GBR	14503	GBR	15757	GBR	14143	AUS	42.9
12	ITA	14990	FIN	16179	NOR	15282	ITA	48.9
11	AUS	16001	ITA	16777	AUS	15316	JPN	49.9
10	CAN	16280	AUS	17111	FIN	15620	FIN	48.3
9	FIN	20710	JPN	17481	JPN	16288	FRA	52.8
8	USA	21593	SWE	17797	ITA	16301	ITA	60.1
7	NLD	21868	FRA	17956	FRA	16309	GBR	52.5
6	FRA	21968	NLD	18184	BEL	16327	SWE	54.6
5	BEL	22243	NOR	18852	NLD	16811	DNK	52.7
4	SWE	23218	BEL	19380	SWE	17121	NLD	57.9
3	NOR	23228	DNK	19767	DNK	17920	BEL	58.5
2	DNK	26249	CAN	20224	CAN	18481	CAN	51.7
1	JPN	28217	USA	22897	USA	21346	USA	47.9

Notes: The inequality-adjustment in the last four columns is based on GNP/cap, PPP shown in the fourth column. For other definitions, see 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)				
73	TZA	185	COL	n.a.	TZA	472	TZA	41.0	33.3	TZA	25.8
72	VNM	206	TZA	498	SLE	674	SLE	37.1	15.9	SLE	22.8
71	NGA	224	YEM	649	UGA	750	UGA	67.0	44.3	ZMB	34.9
70	NER	234	MLI	672	MLI	926	MLI	63.5	75.1	UGA	50.4
69	SLE	246	NGA	800	ZMB	934	ZMB	51.7	69.0	MLI	46.5
68	UGA	251	NER	835	KEN	984	KEN	45.6	40.9	KEN	29.5

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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)
67	MLI	UGA	YEM	NER	NGA	SEN	NGA
66	BGD	ZMB	SLE	NGA	NER	NGA	NER
65	YEM	SLE	GHA	YEM	YEM	NER	SEN
64	IND	KEN	VNM	SEN	SEN	MRT	YEM
63	KEN	VNM	KEN	GHA	GHA	YEM	GHA
62	GHA	BGD	BGD	VNM	VNM	HND	MRT
61	CHN	SEN	MRT	MRT	MRT	GHA	HND
60	MRT	MRT	SEN	BGD	HND	VNM	VNM
59	PAK	CIV	IND	HND	BGD	LSO	LSO
58	ZMB	GHA	PAK	LSO	LSO	GIN	BGD
57	GIN	PAK	CHN	IND	CIV	BGD	ZWE
56	SEN	IND	CIV	CIV	IND	GTM	GIN
55	LKA	CHN	HND	PAK	PAK	ZWE	CIV
54	HND	GIN	LSO	CHN	CHN	CIV	CHN
53	ZWE	BOL	GIN	GIN	ZWE	CHN	PAK
52	CIV	LSO	BOL	ZWE	GIN	IND	IND
51	LSO	IDN	LKA	BOL	BOL	PAK	GTM
50	IDN	HND	IDN	GTM	GTM	BOL	BOL
49	BOL	LKA	ZWE	DOM	DOM	PAN	DOM
48	EGY	ZWE	PHL	LKA	PHL	DOM	PHL
47	PHL	EGY	DOM	PHL	LKA	PHL	PAN
46	MAR	ECU	EGY	IDN	IDN	ECU	LKA
45	DOM	GTM	JOR	ECU	ECU	BRA	ECU
44	GTM	MAR	MAR	JOR	JOR	LKA	IDN
43	ECU	JAM	ECU	PAN	PER	IDN	JOR
42	JOR	JOR	PER	PER	PAN	JOR	PER
41	ROM	PER	GTM	EGY	MAR	ZAF	JAM
40	DZA	DOM	JAM	MAR	JAM	PER	MAR
39	BGR	PHL	COL	JAM	EGY	COL	COL
38	JAM	PAN	CRI	COL	COL	JAM	BRA
37	TUN	TUN	PAN	BRA	THA	MAR	EGY
36	PER	THA	THA	THA	BRA	THA	CHL

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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)					
35	PRY	1900	PRY	4648	TUN	4773	CRI	53.9	CRI	50.5	THA	34.4
34	THA	2013	DZA	5042	DZA	4798	CHL	61.8	CHL	43.9	ZAF	23.2
33	COL	2119	MYS	5262	ROM	4811	TUN	78.5	ZAF	37.7	CHL	42.1
32	PAN	2432	CHL	5436	PRY	5072	ZAF	51.3	TUN	59.8	MEX	40.9
31	POL	2611	TUR	5668	CHL	5791	DZA	80.4	DZA	61.3	TUN	62.7
30	TUR	2673	VEN	5680	TUR	5800	PRY	78.6	PRY	60.3	PRY	62.9
29	CRI	2982	CRI	5853	BRA	6052	TUR	74.8	MEX	45.0	DZA	66.7
28	MUS	2988	BGR	6190	POL	6225	MYS	70.1	MYS	51.7	MYS	51.8
27	MYS	3109	POL	6213	MYS	6247	MEX	61.9	TUR	55.9	TUR	57.7
26	MEX	3143	BRA	6271	BGR ^a	6575	ROM	92.3	ROM	76.6	VEN	55.7
25	CHL	3237	MUS	6468	VEN	6745	VEN	74.0	VEN	55.9	ROM	85.0
24	VEN	3344	MEX	7152	MEX	7093	POL	90.6	POL	73.8	POL	82.2
23	ZAF	4026	ROM	7233	ZAF	7476	BGR	92.3	BGR	75.5	BGR	85.5
22	BRA	4108	ZAF	9215	MUS	8980	MUS	79.4	MUS	60.4	MUS	63.8
21	HUN	4740	KOR	10293	HUN	9180	KOR	84.3	KOR	66.4	KOR	71.9
20	KOR	8119	HUN	10467	KOR	9949	HUN	92.6	HUN	76.7	IRL	57.9
19	PRT	10082	PRT	12878	PRT	12229	PRT	80.6	PRT	63.2	PRT	64.2
18	GRC	11265	IRL	13538	GRC	12292	IRL	76.6	GRC	64.8	HUN	86.2
17	IRL	14124	GRC	13643	IRL	13031	GRC	82.3	IRL	65.4	GRC	67.1
16	ESP	14317	ESP	14848	ESP	14436	NZL	80.8	NZL	63.4	NZL	64.5
15	NZL	14442	SGP	15219	NZL	15219	ESP	87.3	ESP	69.7	AUS	55.7
14	AUS	18185	NZL	15485	GBR	18135	AUS	75.1	SGP	59.0	ESP	76.4
13	ITA	18236	AUS	19044	SGP	18425	SGP	79.1	AUS	58.3	SGP	64.7
12	GBR	18253	GBR	19171	ITA	19015	GBR	85.4	HKG	58.0	HKG	62.0
11	SGP	18356	HKG	19392	AUS	19086	HKG	76.9	GBR	67.7	GBR	73.7
10	CAN	18807	ITA	19902	NLD	19652	NOR	82.8	ITA	67.3	NOR	67.6
9	HKG	19187	FIN	20064	FIN	19720	ITA	87.8	NOR	66.7	DNK	64.1
8	NLD	25737	NLD	20354	BEL	19729	NLD	87.0	SWE	67.5	NLD	74.0
7	BEL	26358	SWE	20412	NOR	19837	SWE	85.9	NLD	70.6	ITA	77.4
6	FIN	26614	DNK	21942	SWE	20026	DNK	82.1	DNK	66.9	SWE	73.5
5	USA	26721	NOR	21965	HKG	20827	FIN	89.4	BEL	73.4	USA	57.5
4	SWE	26836	BEL	22336	DNK	21151	BEL	89.7	FIN	73.9	FIN	78.4

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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)
3	NOR	CAN	CAN	CAN	CAN	BEL	USA
2	DNK	USA	USA	USA	USA	CAN	CAN
1	LUX	LUX	LUX	LUX	LUX	LUX	LUX

Notes: For definition of columns, see 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)
77	ETH	TZA	TZA	GNB	GNB	GNB	GNB
76	BDI	BDI	ETH	TZA	TZA	CAF	TZA
75	GNB	ETH	BDI	ETH	ETH	NER	ETH
74	MOZ	GNB	GNB	BDI	CAF	TZA	CAF
73	TZA	MLI	ZMB	CAF	BDI	ETH	NER
72	NER	ZMB	NER	NER	NER	ZMB	ZMB
71	NPL	YEM	MLI	ZMB	ZMB	BDI	MLI
70	NGA	MOZ	YEM	MLI	MLI	MLI	BDI
69	MDG	NER	UGA	NGA	NGA	NGA	NGA
68	BFA	MDG	NGA	BFA	BFA	BFA	BFA
67	MLI	NGA	BFA	UGA	GMB	GMB	GMB
66	YEM	BFA	MOZ	MOZ	UGA	UGA	UGA
65	KHM	KEN	CAF	MOZ	MOZ	MOZ	MOZ
64	VNM	CAF	GMB	YEM	KEN	LSO	KEN
63	UGA	UGA	GHA	KEN	YEM	KEN	NIC
62	CAF	NPL	MRT	MRT	MRT	NIC	NIC
61	KEN	KHM	KEN	KHM	NIC	YEM	LSO
60	GMB	SEN	KHM	NIC	KHM	MRT	MRT
59	BGD	LAO	MNG ^a	GHA	GHA	NAM	KHM
58	ZMB	BGD	LAO ^a	MNG	LSO	KHM	YEM
57	GHA	GMB	NPL	LSO	MNG	GHA	GHA

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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)	
56	NIC	421	CIV	1477	SEN	58.7	NAM	14.7
55	LAO	428	MRT	1477	SEN	63.3	HND	31.0
54	IND	436	MNG	1593	LAO	69.6	NPL	46.3
53	MNG	453	PAK	1681	BGD	47.4	NPL	50.2
52	MRT	468	GHA	1710	HND	66.4	LAO	53.4
51	PAK	513	VNM	1719	VNM	25.7	BGD	49.7
50	SEN	578	GIN	1778	CIV	63.9	VNM	47.0
49	GIN	600	NIC	1826	NAM	63.3	CIV	46.3
48	LSO	692	IND	2021	PAK	56.6	MDG	39.4
47	HND	703	PNG	2059	MDG	68.8	PNG	32.5
46	CHN	726	HND	2273	IND	49.1	PAK	52.4
45	CIV	745	LSO	2331	PNG	62.2	IND	45.1
44	GUY	775	IDN	2574	GIN	59.7	GIN	42.6
43	LKA	794	ECU	2963	PHL	53.8	PHL	36.8
42	IDN	922	LKA	3002	GUY	59.8	CHN	42.6
41	PNG	975	EGY	3177	CHN	60.2	GUY	43.1
40	EGY	1183	CHN	3206	PHL	65.6	ECU	39.1
39	PHL	1206	JAM	3254	ECU	56.3	LKA	48.8
38	ROM	1316	MAR	3283	IDN	65.8	MAR	43.4
37	MAR	1378	GUY	3371	MAR	60.5	PER	36.8
36	BGR	1395	JOR	3643	JAM	63.6	IDN	49.1
35	DZA	1502	PHL	3779	PER	53.8	JAM	46.6
34	ECU	1584	PER	4303	JOR	63.6	JOR	46.6
33	JOR	1644	DZA	4566	EGY	71.1	ZAF	25.5
32	JAM	1728	BGR	4711	PAN	51.5	PAN	34.7
31	NAM	2175	PAN	5158	DZA	40.7	BRA	31.8
30	PER	2339	THA	5479	ROM	64.7	DZA	47.8
29	THA	2602	NAM	5741	ZAF	71.3	EGY	55.2
28	PAN	3087	ROM	5935	BRA	48.3	ROM	55.4
27	TUR	3329	BRA	6606	BGR	58.6	THA	41.4
26	MEX	3496	TUR	6615	THA	72.7	MEX	33.1
25	POL	3677	MEX	7577	MEX	49.7	CHL	29.2

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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)
24	ZAF 3910	POL 7713	MEX 7614	TUR 77.5	TUR 58.5	CHL 43.4	TUR 41.3
23	MUS 4001	CHL 8325	POL 8401	CHL 63.0	CHL 45.2	TUR 61.6	BGR 57.1
22	BRA 4545	ZAF 8374	HUN 9100	POL 85.9	POL 66.3	POL 74.9	POL 49.6
21	HUN 4805	MUS 8461	CHL 9545	HUN 91.7	HUN 74.7	BHS 47.6	HUN 59.6
20	CHL 5401	HUN 10074	MUS 12525	MUS 82.1	MUS 63.3	HUN 84.2	MUS 46.3
19	KOR 11084	KOR 13551	KOR 13205	BHS 70.8	BHS 54.7	MUS 68.2	BHS 37.7
18	BHS 12045	BHS 14261	PRT 14366	KOR 86.1	KOR 68.4	NZL 57.0	PRT 47.5
17	PRT 12062	PRT 14843	BHS ^a 15869	PRT 82.7	PRT 64.4	PRT 67.5	KOR 52.0
16	NZL 15585	NZL 16242	NZL 16328	NZL 76.5	NZL 59.8	NZL 74.1	NZL 42.6
15	ESP 16572	ESP 16553	ESP 16679	ESP 84.6	ESP 67.0	ESP 71.4	ESP 50.4
14	ITA 20078	SWE 20682	ITA 20960	ITA 83.6	HKG 55.0	HKG 56.8	HKG 37.9
13	CAN 20698	FIN 20818	FIN 21208	GBR 83.8	ITA 65.8	ITA 69.5	ITA 49.0
12	GBR 21407	ITA 20876	FRA 21313	HKG 74.8	GBR 65.5	GBR 70.8	GBR 48.7
11	AUS 22592	GBR 20915	GBR 21556	FRA 88.7	FRA 71.2	DNK 63.6	DNK 45.6
10	HKG 22760	HKG 21352	SWE 21717	FIN 92.8	DNK 62.7	FRA 79.2	FRA 55.3
9	SWE 28792	FRA 21546	BEL 22471	DNK 80.2	FIN 76.4	AUS 73.1	AUS 52.6
8	FRA 28921	AUS 22314	NLD 23225	SWE 93.0	AUS 68.9	CAN 75.0	CAN 53.3
7	FIN 29121	NLD 22712	AUS 23837	BEL 91.1	CAN 69.5	FIN 86.4	FIN 61.8
6	BEL 29878	CAN 23470	CAN 23987	AUS 86.0	BEL 75.0	BEL 82.8	BEL 60.0
5	NLD 30209	BEL 23975	HKG 24902	CAN 86.9	SWE 77.9	NLD 86.2	NLD 59.6
4	USA 30592	DNK 24218	DNK 25118	NLD 90.5	NLD 74.7	NLD 81.4	SWE 63.8
3	DNK 37004	NOR 26977	NOR 26403	NOR 92.1	USA 62.8	USA 65.3	USA 45.8
2	NOR 37538	USA 29852	USA 31167	USA 80.9	NOR 76.2	NOR 84.6	NOR 61.6
1	LUX 48749	LUX 37167	LUX 38973	LUX 92.4	LUX 76.5	LUX 85.7	LUX 61.9

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 GNI per capita, 1996 prices (WDI, 2002).

***: Real GNP per capita, 1996 prices (Summers and Heston, 1991; Heston, Summers, and Aten, 2001).

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

^b: Income data of Vietnam (VNM) from 1997.

Table 7: Test of Sensitivity

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
	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
	Sri Lanka	47.0	I G H	44.0	I G P	-	-	-	+2
	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
	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
	Spain	34.2	I G H ^c	26.8	E N H	+2	+2	+2	+2
	Sweden	29.4	I G H	32.4	I N H	-2	-2	-2	-2
1990	Algeria	38.7	E N P	40.1	E - H ^d	-	-1	-2	-3
	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
	Finland	26.1	I N H	20.2	I N H ^{eq} ^c	+1	+1	+4	+3
	Ghana	36.7	E N P	33.9	E - H ^{pc}	-	-	-	-
	Ireland	34.6	I N H	38.9	I G H	-	-2	-	-1
	Jordan	40.7	E N P	43.4	E - H ^{pc} ^d	-1	-2	-2	-2
	Kenya	54.4	E N P	57.5	E - H ^{pc} ^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 - H ^{pc} ^d	-2	-1	-2	-1
	Pakistan	31.4	E N H	32.4	I G H	+1	-	-	-
	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

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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
	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	Denmark	37.4	I G F ^c	33.7	I N F ^c	-	-	+1	-
	Madagascar	43.4	E N P	46.0	E - Hpc ^d	-	-1	-1	-1
	Turkey	41.5	E - Hpc ^d	49.0	I N H ^c	-1	-2	-1	-4
	Uganda	39.2	E - Hpc	40.8	E - P	-	-	-	-

^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 (World Bank, 2002a).

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). In a few cases an equivalence scale was applied to calculate the data (Heq). If any component is not reported or unknown,

- is shown.

Table 8: **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.

Table 9: **Change in Rankings Due to Adjusted Gini Coefficients**

	No change	1 Rank	2 Ranks	3 Ranks	4+ Ranks
<i>Sen measure</i>					
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	43	21	6	1	1
<i>Dagum measure</i>					
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	35	30	6	0	1

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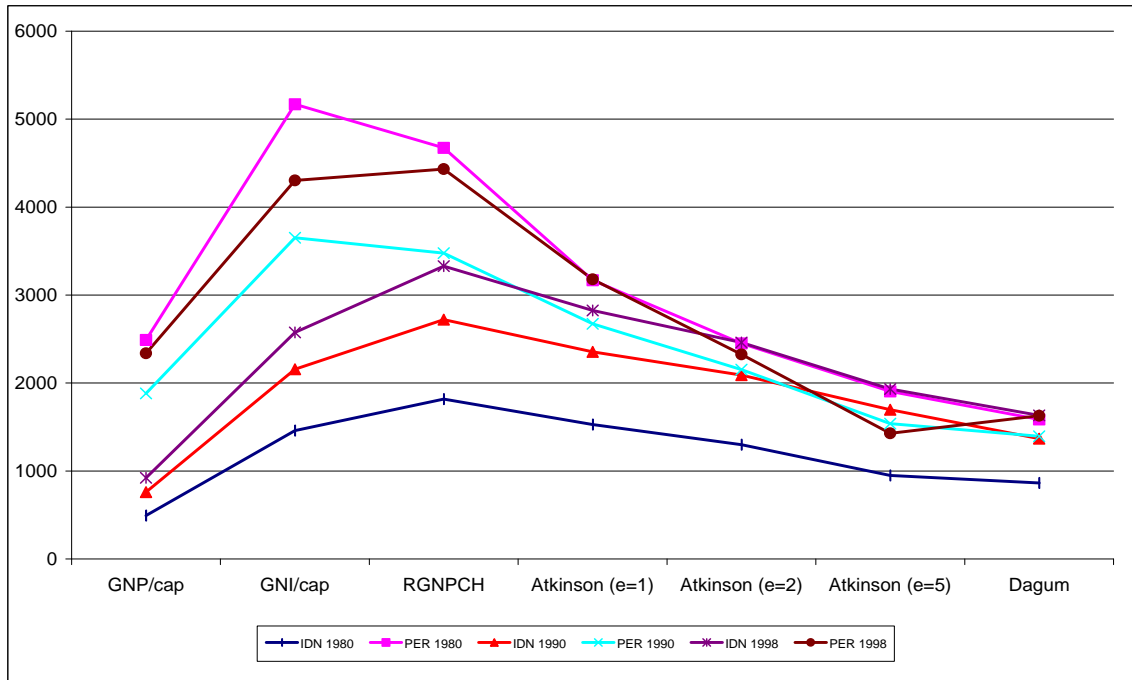
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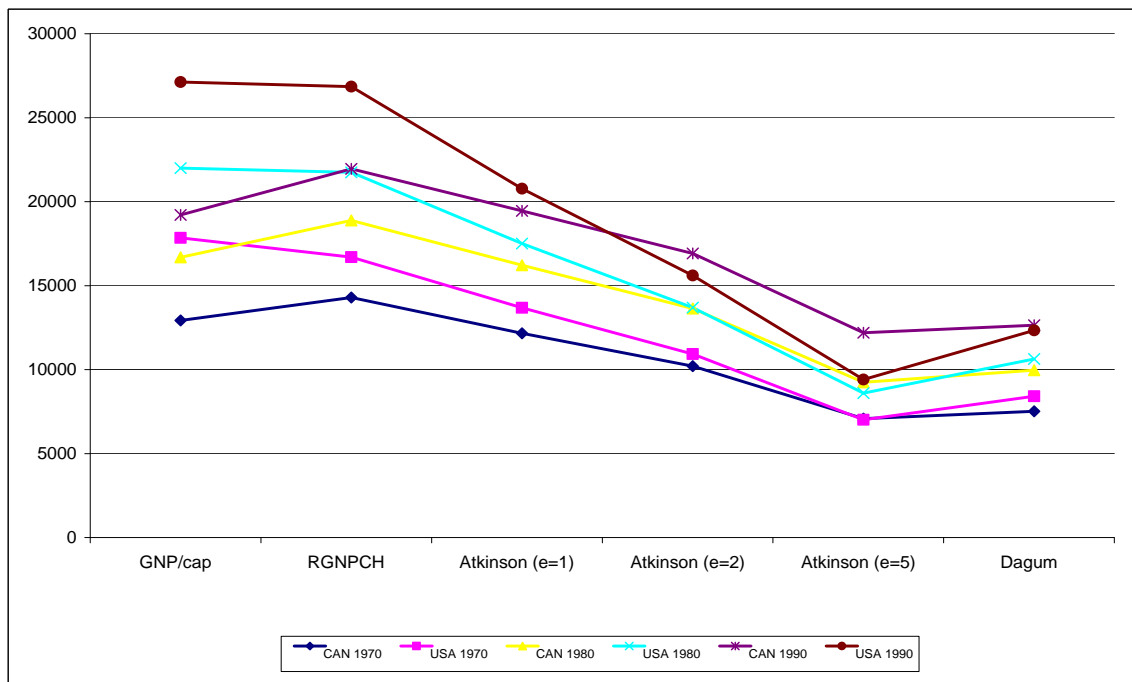
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Figure 1: Welfare Comparison: Indonesia versus Peru, 1980-1998



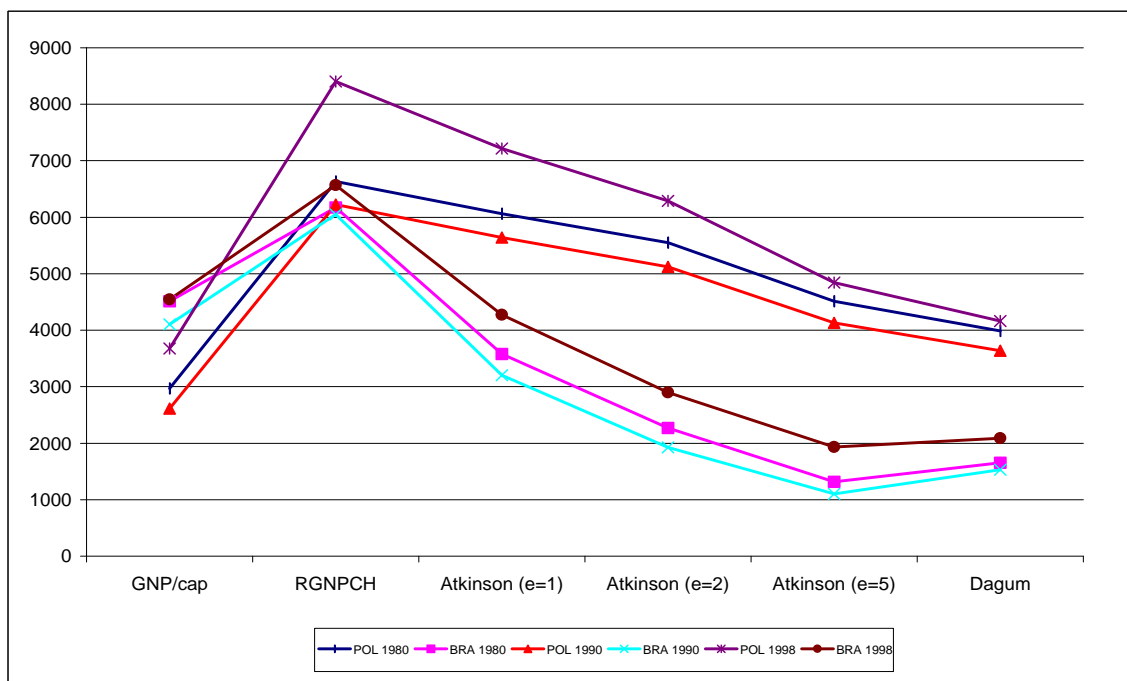
Notes: GNP/cap: GNP per capita, constant 1996 US-Dollars (WDI, 1999, 2001). GNI/cap: Real GNI per capita, 1996 prices (WDI, 2002). RGNPCH: Real GNP per capita, 1996 prices (Summers and Heston, 1991; Heston, Summers, and Aten, 2002).

Figure 2: Welfare Comparison: Canada versus USA, 1970-1990



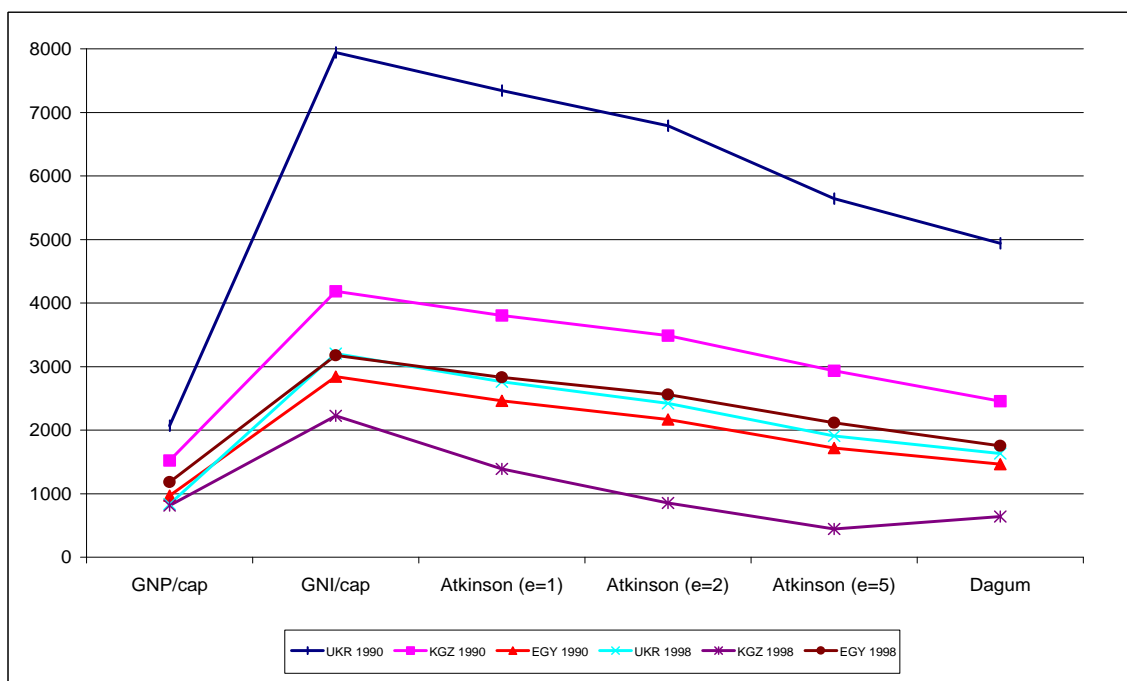
Notes: For definition of incomes, see Figure 1.

Figure 3: Welfare Comparison: Poland versus Brazil, 1980-1998



Notes: For definition of incomes, see Figure 1.

Figure 4: Welfare Comparison: Ukraine, Kyrgyzstan, and Egypt 1990-1998



Notes: The income data used are from WDI (2002). See text for details.