GROWTH, INEQUALITY, AND WELFARE: COMPARISONS ACROSS SPACE AND TIME

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EUDN/WP 2006 - 17

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November 27, 2006

Abstract

We propose and apply several welfare measures that combine average income with a measure of inequality to undertake cross-country comparisons of aggregate welfare for the 1970 to 2000 period. Our welfare measures, which are based on theoretical and empirical findings on the role of inequality in social welfare, drastically change the impression of levels of welfare, significantly affect the welfare ranking of countries in different benchmark years, affect changes in ranking over time, and affect convergence between industrialized and developing countries. While the results are sensitive to the type of inequality and its presumed effect on welfare, the results are robust to different ways to address comparability problems inherent in the inequality data used.

JEL classification: I31, D63

Keywords: Growth, Income Distribution, Welfare Measurement

*We thank Syed Ahsan, Tony Atkinson, François Bourguignon, James Foster, Thesia Garner, Nanak Kakwani, Ekkehart Schlicht, Tony Shorrocks, Michael Ward, and two anonymous referees and the editors of this journal for helpful comments and discussions on this topic. Comments on earlier drafts of the paper from discussant and participants at the 22nd IARIW conference in Cracow 2000, the inequality conference in Milan in 2002, the CESifo conference on globalisation in Munich 2002, and the UNU/WIDER conference on inequality, poverty and human well-being in Helsinki in 2003 were also much appreciated.

1 Introduction

Despite its well-known short-comings, GNI per capita (and the associated per capita income growth rate) is still the most widely used indicator for comparisons of aggregate welfare across countries and over time. While many potential improvements to address these short-comings are either conceptually or empirically difficult or controversial, the complete neglect of the welfare implications of income inequality is an issue where there is broad and growing agreement in the theoretical, empirical, and experimental literature. Although there continue to be debates about the nature, type, and size of the well-being consequences of income inequality, a range of welfare measures combining incomes and their distribution have been proposed over the years that can accommodate these different views (e.g. Atkinson, 1970; Sen, 1976; Dagum, 1990). In the past the application of those measures to welfare comparisons was limited, mainly because of lack of comparable data on income distribution, but also due to limited evidence on the size of the impact of inequality on welfare.

Recent years, however, have seen great advances being made in the generation of comparable data on income inequality across countries and across time (e.g. Deininger and Squire, 1996; Gottschalk and Smeeding, 1997; WIID, 2005). Moreover, recent findings from the experimental literature as well as from the subjective well-being literature have solidified the empirical basis for including inequality in an assessment of welfare. The main contribution of this paper is therefore to apply aggregate welfare measures that are consistent with these findings on the role of inequality in affecting welfare to these newly available and more comparable data on inequality to make international welfare comparisons. In particular, we apply four welfare measures that combine mean incomes and income distribution (two of the Atkinson family and two measures using the Gini coefficient) to compare aggregate welfare across countries in the time period 1970-2000. In doing so we seek to answer the following questions. First, given the findings from the empirical and experimental literature on the relevance of inequality for welfare assessment, how do different ways of incorporating inequality in our assessment of welfare affect welfare levels and rankings of countries and regions? In particular, are there differences between welfare measures that are only affected by individual incomes and those that consider relative incomes and thus the income distribution itself? Second, how do these measures affect welfare rankings over time, including trends of convergence and divergence between rich and poor countries? Third, are these assessments of rankings robust given the existing problems of data quality and comparability with respect to inequality data?

The main findings of the paper are as follows. First, we find that plausible ways to incorporate inequality in welfare assessments that are consistent with the theoretical and empirical literature on the subject dramatically reduce levels of welfare in most countries. The size of the welfare penalty differs greatly between countries and regions and is also sensitive to the welfare measure used. Second, the ranking of countries at a point in time and over time is significantly affected in our inequality-adjusted measures and this result is robust to data and comparability problems of the inequality data used. Third, the frequency of rank changes of our welfare measures relative to per capita income rankings increases over time, particularly in richer countries which is partly due to an increasing divergence of inequality trends among rich countries. Lastly, findings on convergence

between industrialized and developing countries are also affected by incorporating inequality in welfare measurement. In particular, the discrepancy of welfare levels between industrialized and developing countries is larger than when per capita incomes are used. Conversely, convergence of East Asia as well as divergence of Sub Saharan Africa appear larger in per capita incomes than in welfare terms.

The paper is organized as follows: the next section discusses previous work in this area and summarizes the conceptual approach as well as the aggregate welfare measures we use in the paper. Section 3 discusses the data and our manipulations for this analysis. Section 4 presents the results for the welfare analysis across space and time, section 5 the sensitivity analysis. Section 6 concludes.

2 The role of income inequality in welfare measurement: Prior literature and proposed measures

While per-capita income ignores the distribution of income in an aggregate welfare assessment,[1] a range of approaches to the measurement of welfare, including utilitarianism assuming declining marginal utility of incomes, Sen's capability approach or Rawlsian reasoning would suggest that (income) inequality reduces aggregate welfare. These insights have been incorporated, for example, in Lambert's (1989) 'abbreviated social welfare functions' where aggregate welfare is an increasing function of mean incomes and a declining function of income inequality. The question then only arises what particular functional form such an abbreviated social welfare function should take, a subject we take up below and should also be guided by empirical evidence regarding the importance of certain types of inequality for aggregate well-being.

There have been a number of papers that have used versions of such abbreviated social welfare functions for cross-country and intertemporal welfare comparisons. The first paper applying such measures to international welfare comparisons is Kakwani (1981). It considers the Sen measure we also use (see below) as well as a measure using a slightly milder form of a welfare penalty for inequality and additionally adjusts aggregate welfare levels for life expectancy shortfalls in a country (relative to 75 years). This is done for 62 countries using data from around 1970 and examines rank changes as well as between-country inequality using these different welfare measures (plus GDP per capita). Among the paper's findings are that country rankings are quite sensitive to incorporating inequality in welfare assessments and that between-country inequality in welfare terms is larger compared to between-country inequality in per capita incomes. Our paper differs from this interesting first study of international welfare comparisons by using a much larger, more reliable, and more comparable data set for incomes[2] but particularly for inequality, by considering changes in ranking over time, and by considering a broader range of welfare measures.

[1] See Gruen and Klasen (2003) for a critical discussion of possible justifications for this neglect.

[2] Kakwani (1981) already uses the first set of PPP-adjusted income measures available then, but these were based on true price comparisons for only 10 countries and interpolations for the remaining observations.

Two more recent studies have examined trends in inequality-adjusted aggregate welfare in the United Kingdom. Atkinson (1997) shows that, again using the Sen measure, aggregate welfare improvements in the UK in the 1980s were much smaller than growth of mean incomes. This issue is investigated in greater detail in Jenkins (1997) who studies changes in welfare in the UK between 1979 and 1990/91 using welfare measures based on Atkinson's inequality indicator for different degrees of inequality aversion as well as the Sen measure. Despite respectable growth in mean incomes, the generalized Lorenz curves for the income distribution in 1979 and 1990/91 cross and thus do not allow a unanimous social welfare ordering between the two years. Using the welfare measures, aggregate welfare fell during the Thatcher years only if relatively strong inequality aversion ($\varepsilon = 2$) is assumed. A study similar in spirit is Klasen (1994) who considers changes in welfare in the USA using, among others, the Sen and Dagum measures we use below for the years 1947-1990. It shows that, due to rising inequality, aggregate welfare fell in the 1980s using some of these measures, while improvements in aggregate welfare were much larger in the 1960s, compared to income growth rates. While these single-country studies are very much in the spirit of our investigation, we are interested here in international welfare comparisons and how they evolve over time.

Lastly, Gruen and Klasen (2003) considers the same measures used here to study intertemporal and global trends in welfare for the period 1960-1998. Due to rising inequality in most countries of the world since about the early 1980s, it finds that aggregate welfare improvements in these countries are overstated when per capita income growth rates are used which is then illustrated with a number of particularly stark case studies, including the USA, the UK, as well as transition countries.[3] In contrast, it finds that declining intercountry inequality in recent years suggests that global welfare has improved faster than global per capita income.[4] This paper differs by focusing on cross-country comparisons and how they have evolved over time and by using a more updated (and more reliable) data set on inequality.

In the spirit of this literature and Lambert's treatment of the issue, we start with an abbreviated social welfare function of the following form (Lambert, 1989):

$$W = V(\mu, I).$$

Welfare W is a function of mean income μ and a measure of inequality I. In fact, all of our measures are consistent with more structure on the function V and can be expressed as:

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

Several measures will be considered as they differ in to the intensity of welfare penalty as well as the type of inequality that attracts the largest penalty.

[3]See also Gruen and Klasen (2001) for a related paper that just focuses on changes in aggregate welfare in transition countries.

[4]This finding is sensitive to purchasing power parity adjustments, the use of survey means versus national accounts for mean income data, the inclusion of within-country inequality, and the weighting by population. We use population weighting, PPP adjusted mean incomes from national accounts, and include within-country inequality to arrive at this conclusion. See Gruen and Klasen (2003); Deaton (2005); Sala-i Martin (2006) for further discussion.

The first measure considered here was proposed by Sen (1976) and incorporates inequality by using the Gini coefficient G:

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

The Sen measure can be derived from a social welfare function assuming 'rank order weighting' where the weight of a person's income depends inversely on the rank in the income distribution (Sen, 1976). It can also be derived from a utility function where individuals consider not only their own income, but the entire income distribution or, alternatively, their position in the income distribution (Dagum, 1990). The measure also has a nice graphical illustration (Sen, 1997), representing twice the area below the generalized Lorenz Curve.

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

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

Clearly, the Dagum measure is a more extreme version of the Sen measure as it results in a higher penalty for inequality. The Dagum measure is based on a social welfare function where individuals are negatively affected not only by overall income inequality but additionally by people ahead of them in the income distribution which may be the result of envy or asymmetric utility functions.[5]

In addition, two welfare measures based on Atkinson's well-known inequality index are used. The Atkinson inequality measures were developed as indicators of inequality that explicitly consider the welfare loss associated with inequality (Atkinson, 1970). But one can equally well just use the way the welfare loss of inequality is calculated, the *equally distributed equivalent income*, as the welfare measure itself. 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. The general form of this measure is given in equation (4):

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

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

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

The Atkinson measures can be derived from social welfare functions that are additively separable functions of individual incomes x_i. Thus they are based on individualistic utility

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

functions where people only care about their own incomes. Inequality reduces welfare in this formulation as the utility functions considered are concave for all $\varepsilon > 0$.[6]

Before turning to the data and the results, it is important to briefly discuss the most important differences between the two sets of measures.[7] Apart from the size of the penalty applied to inequality, the two Gini-based measures differ quite fundamentally from the two Atkinson measures. In the Gini-based measures, relative incomes and thus the shape of the income distribution itself have a separate and additional impact on well-being, over and above the effect the income distribution has on individual incomes.

On the other hand, the Atkinson measures have a number of desirable axiomatic properties, including subgroup consistency, transfer sensitivity (i.e. identical transfers have a larger impact on welfare when they take place at the lower end of the income distribution), and Pareto consistency (e.g. Atkinson, 1970; Sen, 1997; Blackorby and Donaldson, 1978). The two Gini-based measures are not subgroup consistent, fail transfer sensitivity and fail Pareto consistency so that one could construct cases where increases in the incomes of the richest, ceteris paribus, reduces welfare. Transfers close to the mode of the distribution (which itself is close to the median in most empirical income distributions) have the largest effect on Gini coefficient so that the welfare penalty of inequality will be largest when middle income groups have particularly low income shares in the Gini-based measures, while using the Atkinson measures, the welfare penalty will be largest when the poorest have low income shares.

Which measures better capture the type and extent of welfare penalty that income inequality should attract is largely an empirical issue. Fortunately, a sizable literature in experimental economics and on subjective well-being has recently arrived at a number of interesting insights into this question. The most important findings from this literature are discussed in detail in (Klasen, 2006). Two findings stand out, however. First, there is now overwhelming experimental and subjective well-being evidence that confirms the negative aggregate welfare implications of inequality (e.g. Okun, 1975; Amiel, Creedy, and Hurn, 1999; Fehr and Schmidt, 1999; Engelmann and Strobel, 2004; Kroll and Davidovitz, 2003; Carlsson, Daruvala, and Johansson-Stenman, 2005; Johansson-Stenman, Carlsson, and Daruvala, 2002). While individual studies differ, it is fair to say that the welfare 'penalty' of inequality implied by the measures used here is within the range of the findings from this literature. Second, most of these studies suggest that relative incomes matter a great deal in welfare measurement and therefore suggest that the shape of the income distribution itself has an impact on perceived aggregate welfare. This would favor the Gini-based measures that consider relative incomes explicitly over the axiomatically more elegant Atkinson measures (Amiel, Creedy, and Hurn, 1999; Bolton and Ockenfels, 2000; Carlsson, Daruvala, and Johansson-Stenman, 2005; Schwarze and Härpfer, 2002; Alesina, Di Tella,

[6] All the measures exhibit constant relative risk aversion. The $\varepsilon = 1$ has the additional property of being based on a constant elasticity utility function, suggesting that a percentage increase in income is valued the same regardless of its recipient. Such an assumption has quite a lot of intuitive appeal. While clearly $\varepsilon = 2$ penalizes inequality more than $\varepsilon = 1$ and is thus based on declining elasticity of income, the underlying assumption, that at twice the level of income, a percentage increase in income is valued half as much as at the lower level of income, also appears to be within the range of reasonable presumptions (see UNDP, 1990).

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

and MacCulloch, 2004; Clark and Oswald, 1995; Blanchflower and Oswald, 2003; Graham and Pettinato, 2002; Clark, 2003; Schwarze and Härpfer, 2002). This should be borne in mind when interpreting the results below where Gini-based measures and Atkinson measures yield sometimes different results.[8]

3 The data

To calculate our measures, we need data on per capita incomes, Gini coefficients, and income shares (to approximate the distribution for the calculation of the Atkinson measures). Our source of data on inequality is the World Income Inequality Database version 2.0a (WIID, 2005), which provides around 4,600 Gini coefficients and approximately 2,300 quintile or decile shares for 152 countries.[9] Each observation has been assigned a quality rating ranging from 1 (survey and income concept are known and ok) to 4 (so-called memorandum items and considered as unreliable).

Since we will adjust the inequality data to ensure comparability (see also below), we retrieve data from all four categories as long as they are representative of the entire population, are based on gross or disposable income, or on expenditures (or consumption), and on households or families as the income sharing unit.[10] With this selection, it turns out that almost 60 per cent of our data fall into the first two quality categories and only 3 per cent (all used for the first benchmark year 1970) belong to the least reliable category.

The data are assembled for 4 benchmark years (1970, 1980, 1990, 2000). In cases where there is no data point for that particular benchmark year, the closest data point available was chosen. When several Gini coefficients with associated income shares were available for a particular country at a particular point in time, the observation consistent with the definition of previous or subsequent benchmark years was retained; the sensitivity of our results to this choice is examined below.

To ensure comparability, the inequality measure should ideally be based on a single definition of income and income sharing unit both across countries and time. Pursuing this strategy would result in only a small number of countries and not allow a meaningful international or intertemporal analysis. Following the standard in the literature (e.g.

[8] Of course, there are other inequality measures one could also have used, including the Theil measure which is, similar to the Atkinson measures, sensitive to transfers at the bottom of the distribution, or the Coefficient of Variation (CV) which is particularly sensitive to transfers at the top of the distribution. While we prefer the Atkinson over the Theil measure (both which come from the class of generalized entropy measures) for its intuitive appeal, we do not use the CV as both theoretical and empirical contributions to welfare economics suggest that transfers at the bottom or the mode of the distribution should receive most weight in welfare assessments. We should also emphasize that we are trying to make static well-being comparisons for given levels of income and inequality. It may be the case that there are dynamic trade-offs (or conversely win-win situations) between the two phenomena so that in a dynamic setting one might prefer higher inequality if it delivered higher income in future. It appears, however, that the evidence for such trade-offs is rather weak while there is mounting evidence for lower initial inequality being associated with higher growth. For a discussion see, for example, Deininger and Squire (1998), Forbes (2000), Li, Squire, and Zou (1998), Lundberg and Squire (2003), Klasen (2004).

[9] 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 individual research studies and information provided by various Central Statistical Offices.

[10] We include a few observations where the income sharing unit is unknown.

Dollar and Kraay, 2002; Lundberg and Squire, 2003; Gruen and Klasen, 2001, 2003), we therefore use a regression-based adjustment to the Gini coefficients and quintile shares to reduce the biases generated by different measurement concepts. We thus run a panel regression of all available Gini coefficients (or quintile shares) on the various measurement concepts (using country and period fixed effects). The regression results, based on about 2,200 Gini coefficients and 1,400 quintile shares, are shown in Tables 4 and 5 in the appendix and show expected results. For example, Gini coefficients based on expenditures or consumption are significantly lower than based on incomes, and those based on disposable incomes are also significantly lower than those based on gross incomes, particularly in OECD countries (see interaction term). We then use the appropriate regression coefficients to adjust all Gini coefficients (or quintile shares) that are not based on gross income per capita to that income concept to make them comparable across space and time.[11]

As far as mean income data are concerned, we rely on the purchasing power adjusted real GDP per capita provided by the Penn World Tables, version 6.1 (Heston, Summers, and Aten, 2002).

4 Welfare across space and time

To show the impact of our measures on levels and rankings of welfare across space and time, we proceed in four steps. First, we present welfare comparisons for regions for the year 2000 using the largest possible sample (101 countries). Second we build a consistent sample of 42 countries for which we have information for the four benchmark years and compare changes in levels and ranks of well-being between 1970 and 2000. Third, we consider welfare levels aggregated at regional level for 1970 to 2000, with a particular focus on inter-regional comparisons as well as comparisons with welfare in industrialized countries. Lastly, we show some pairwise country comparisons for 1970 - 2000 to highlight particularly interesting individual results.[12]

Table 1 shows the (population-weighted) mean incomes as well as the distribution-adjusted welfare levels (both in levels and as a proportion of mean incomes, i.e. the ratio of equally distributed equivalent income to mean income) using our different measures by region in 2000.

Given the formulas above, the inequality-adjusted welfare measures are of course all smaller than mean incomes. The size of the 'penalty' for inequality ranges depends on the region and varies from some 20-35% when the Atkinson ($\varepsilon = 1$) measure is used up to 60-75% when the Dagum measure is used. Apart from this level impact of inequality on aggregate welfare, three findings are of particular note.

[11] An example may be useful. Suppose an observed Gini for a country based on expenditure per capita is 50. To make it comparable to Ginis that are based on gross income per capita, we thus add 5.30 as our regression suggests that Ginis based on expenditures are systematically lower by 5.30 percentage points. Thus a comparable Gini equivalent to gross income per person would be 55.3. Please note that regarding the adjustment of quintile shares we run fixed effects panel regressions for the first four quintile shares and calculate the fifth one as a residual.

[12] See appendix for comprehensive league tables and rankings of countries over time. Here we summarize the main findings.

First, aggregate welfare is affected most by inequality in Latin America & Caribbean, with distribution-adjusted levels of welfare reaching only 36% of per capita incomes when the Atkinson ($\varepsilon = 2$) is used and about 27% when the Dagum measure is used. The impact of inequality is second highest in Sub-Saharan Africa, followed by the Middle East & North Africa. In contrast, the aggregate welfare reduction are considerably lower and rather similar in East Asia & Pacific, South Asia, Eastern Europe & Central Asia (consisting of transition countries of Central and Eastern Europe and the former Soviet Union), and high income countries.

Second, the nature of inequality appears to differ between regions. Latin America & Caribbean stands out as the region where the inequality adjusted aggregate welfare is particularly low when the Atkinson measures are used, where, for example, the ratio of inequality-adjusted income to per capita income using the Atkinson ($\varepsilon = 2$) measure is nearly 11 percentage points lower than in any other region, while the difference is smaller than six percentage points using the Dagum measure. Relative to other regions, the poor in Latin America appear to fare particularly badly in comparison to other income groups and since the Atkinson measures are particularly sensitive to the income shares of the poorest, we get these large reductions in welfare relative to per capita incomes.

Third, the discussion so far only focused on the relative role of inequality in aggregate welfare comparisons in different regions, but did not say anything about absolute welfare levels, for which we need to also consider the influence of mean incomes. To see that there are no unanimous answers about absolute welfare levels, Figure 1 shows Generalized Lorenz Curves for the five developing regions. While South Asia (SA) general Lorenz dominates Sub-Saharan Africa (SSA), and is dominated by the three other developing regions shown (confirmed by Table 1 which shows the same ordering of absolute welfare regardless of the welfare measure used), the Generalized Lorenz Curves intersect for the other three regions. Cumulative incomes of the poorest three quintiles are higher in East Asia and the Pacific (EA) than in the Middle East and North Africa (MENA) and Latin America and the Caribbean (LAC), while much higher incomes in the top two quintiles ensure that Latin America has the highest mean income, followed by the Middle East and East Asia. Given this and the fact that the Atkinson and the Gini-based measures give different weights to inequality in different parts of the distribution, it is not surprising that these two sets of measures tell a slightly different story as shown by the absolute values of the welfare measures in Table 1. The Atkinson ($\varepsilon = 2$) measure suggests that East Asia has higher aggregate welfare than Latin America and the Middle East with the latter two having just about identical welfare levels, while the Sen and Dagum measures see Latin America ahead of the other two regions (although only slightly ahead of East Asia using the Dagum measure). The particularly low incomes of the poor lead to this weak performance of Latin America in the Atkinson ($\varepsilon = 2$) measure, while inequality around the mode of the distribution is more similar in the different regions. Depending on whether we are particularly concerned about the situation of the poor or are more guided by the findings from the literature on the importance of relative incomes, will thus lead to different assessments of the comparative welfare in these three regions.

Turning to comparisons over time, we rely on a consistent sample of 42 countries for which we are able to calculate all measures for the four benchmark years.[13] We first present

[13]More information on the countries included is available in the appendix.

some aggregate evidence of rank changes and correlations, then consider the development of different regions, and finally present selected country cases. Table 2 shows rank changes using the four measures, all compared to the per capita income indicator. Rank changes depend not only on the impact of inequality on well-being but also on the size of the differences in per capita incomes; countries whose per capita incomes differ by little, will obviously more easily change ranks than those where the differences are larger. Bearing this in mind, a few interesting observations emerge.

First, regardless of the welfare measure used, the majority of countries experience rank changes compared to their rank in per capita incomes. Second, the rank changes are, not surprisingly, larger the higher the penalty for inequality, for both the Atkinson as well as the Gini-based measures in all four years. Third, closer inspection of the rank changes shows that, in general, large downward shifts are more common than large upward shifts. Among those countries with large downward shifts are consistently many Latin American countries, while a few East Asian and South Asian countries experience sizable upward shifts. In the later periods, there are also large rank changes among rich countries. Hong Kong and Australia are the two rich countries that experience very large downward rank changes while Belgium, Finland, and the Netherlands see large improvements. Fourth, large rank changes appear more frequently with the Atkinson ($\varepsilon = 2$) measure than the Dagum measure, suggesting that the differences in the income shares of the poorest differ more between countries than the income shares of middle income groups.[14]

Lastly, there is a tendency for rank changes in our welfare measures, compared with per capita incomes rankings, to increase over time. As shown in Table 2 the number of countries with three or more rank changes is higher for all four measures in 2000 than in any of the three benchmark years before. The increase is particularly noteworthy for the Atkinson ($\varepsilon = 2$) measure where 22 countries experience a rank change of three or more, compared to only 11 in 1970 and 1980, and 14 in 1990. Closer examination of the rank changes reveal that large rank changes have become more frequent over time in richer countries. If we only consider the richest 15 countries in the sample, the frequency of rank changes of three or more has risen from 1 in 1970, 4 in 1980, 6 in 1990, to 9 in 2000. Two factors are responsible for this. First, convergence of income levels among rich countries have facilitated rank changes even without any changes in inequality levels and trends. But an inspection of correlation coefficients between per capita incomes as well as our four welfare measures shows progressively falling correlations for all four measures with per capita incomes between 1970 and 2000 confirming that the higher frequency of rank changes is not only due to changes in the income distance between countries.[15] The second factor responsible for the increasing frequency of rank changes is therefore a growing divergence in inequality trends since the 1980s in rich countries. While inequality increased by significant amounts in the UK, the USA, Hong Kong, and Australia, it remained largely unchanged in the Netherlands, Finland, France, Italy, and Sweden over the same time period.[16] This increasingly affects rank changes in the inequality adjusted

[14]One should note, however, that income shares of the poorest are more sensitive to measurement error and comparability problems so that this result should be treated with some caution. See also (Milanovic, 2005) and (Sala-i Martin, 2006) for a discussion.

[15]Results are available on request. We also calculated Spearman rank correlation coefficients which are generally smaller than the regular correlation coefficients and show a similar decline over time.

[16]See Gruen and Klasen (2003) for further documentation on these diverging trends and Atkinson (2000) for a discussion of possible reasons for them.

measures and it is therefore not surprising that those with rising inequality (such as Hong Kong or Australia) see larger declines in rankings over time in the inequality-adjusted measures while those with stable income inequality (such as Finland and Sweden) see larger improvements in rankings in these measures over time.

In explaining the overall rank changes and their trends over time, we have already highlighted particular country experiences. We want to deepen this discussion by examining welfare trends at the regional level and pick out particularly interesting pairwise country examples.

In Figure 2 we compare levels and trends in per capita incomes and our four aggregate welfare measures by region for 1970 to 2000.[17] We present this always as a proportion of the income and welfare levels of industrialized countries which thus allows us to say something about convergence of aggregate welfare between developing and industrialized countries. Several points are worth noting here.

First, when examining per capita income levels, we see that Sub-Saharan Africa and Latin America diverged from the industrialized world, particularly since 1980, while we see substantial convergence (from a low level) in East Asia and slight catch up to industrialized countries in South Asia, beginning also in 1980.

Second, when turning to our inequality-adjusted welfare measures, the distance between industrialized countries and the developing regions is much larger in Sub-Saharan Africa, Latin America, and Middle East (not shown) when inequality-adjusted measures are used while they remain roughly the same in South and East Asia. For example, per capita incomes in Latin America were at the 29th percentile of high income countries in 1970, but only at the 17th percentile when the Dagum or Atkinson ($\varepsilon = 2$) measure is used (i.e. a difference of 12 percentage points). A difference of 3-4 percentage points also exists in Sub Saharan Africa and the Middle East and North Africa. Thus the findings of Kakwani (1981) which were based on rather patchy data from around 1970 that between country inequality in inequality-adjusted aggregate welfare measures is larger than in per capita incomes is replicated here with much better data for that year. As shown in the figure, it continues to hold in later decades as well.

Third, when examining trends over time, we see that the combination of higher growth since 1970 and lower inequality throughout ensures that East Asia surpasses the welfare levels of Latin America in 2000 when the Atkinson ($\varepsilon = 2$) and the Dagum measures are used. The comparison between South Asia and Sub Saharan Africa shows that South Asia surpasses Sub Saharan Africa in per capita income terms in 2000. Due to much lower inequality in South Asia throughout, however, it surpassed Sub Saharan Africa in welfare terms already in 1980 or 1990, depending on the measure and the gap has been widening since.[18]

[17] The population-weighted consistent regional sample is slightly larger than the sample of 42 countries we just used as we are somewhat more flexible with the temporal matching of income and inequality data to make the sample larger and more representative. In a few cases (only in Africa and Latin America) we also interpolated inequality data when a data point was missing for a single benchmark year. For details of included countries, see appendix.

[18] Per capita GDP and welfare levels in Sub Saharan Africa are highly sensitive to the inclusion of South Africa, by far the richest economy in Sub Saharan Africa, in the sample. Without South Africa, South Asia was already far richer in 1990. But this only affects levels of income and welfare, not the temporal trends.

Lastly, Figure 3 plots the change in percentiles of a region (relative to the level in industrialized countries) between 1970 and 2000 using the five different measures to examine whether changes different trends in inequality affect the divergence of convergence of regions to the industrialized world. As shown, there is clear evidence of convergence and divergence of different regions. Using our inequality-adjusted measures does not change the qualitative trends, but the quantitative magnitudes of convergence and divergence. In particular, in East Asia (and to a much smaller extent) South Asia, inequality rose faster than in industrialized countries, thus reducing the convergence to the rich world in inequality-adjusted welfare levels. In particular, East Asia gains about nine percentage points on rich countries in GDP/capita but only seven when the Atkinson ($\varepsilon = 2$) or Dagum measure is used. As the last set of bars shows, this is largely driven by China where sharply rising inequality there ensured convergence in inequality adjusted welfare was similarly smaller than in per capita incomes. Conversely, divergence of Sub-Saharan Africa and in Latin America between 1970 and 2000 is not quite as bad as suggested by GDP per capita, as in these regions inequality rose by less than in the industrialized world. As these regional trends, though instructive, are sometimes based on averaging opposing trends within a region, it is also useful to study individual countries to which we now turn.

In Figure 4 we track trends in well-being in Indonesia and Brazil between 1970 and 2000 where we express welfare in Indonesia as a percentage of Brazil's. In 1970 and 1980, per capita incomes were three times larger in Brazil, but inequality-adjusted welfare only about twice as large, showing the impact of Indonesia's lower inequality. By 2000, the situation is dramatically different. Due to higher income growth in Indonesia, Brazil is now less than twice as well-off in income terms. Once inequality is considered, falling inequality (from already much lower levels) ensures that Indonesia is now as well off as Brazil where inequality increased from already high levels. In fact, Indonesia is slightly ahead using the Atkinson ($\varepsilon = 2$) measure, and slightly behind Brazil using the Dagum measure, reflecting again differences in the type of inequality. In Figure 5, we consider Canada's welfare levels as a proportion of those in the USA between 1970 and 1990. While the gap in per capita incomes favoring the USA is rising over time, in inequality-adjusted terms the situation looks very different. Here Canada is only slightly behind in the Gini-based measures with little change over time. In the Atkinson measures, Canada looks much better and improves its position considerably over time, particularly in the 1980s. Due to rising inequality in the USA in the 1980s, leading to particularly low income shares of the poorest quintile, Canada's welfare is nearly 20% higher in the Atkinson ($\varepsilon = 2$) measure, and about equal to the level in the USA when ($\varepsilon = 1$) is used. In Figure 6, we consider Turkey in relation to Russia in 1990 and 2000 to see the impact of transition on relative welfare. In 1990, Turkey was about 40% poorer than Russia and due to its much higher inequality, aggregate welfare was about 60% lower in the inequality-adjusted measures. In 2000, the combination of falling incomes and sharply rising inequality in the transition process in Russia ensures that the income gap has shrunk to less than 20% and stays at about that level in inequality-adjusted welfare.[19]

Lastly, we compare China and India, the world's most populous countries that are often compared to each other and, in fact, often compare themselves (Sen, 2006). In 1970 and 1980, India had higher per capita incomes but higher inequality there ensured that China

[19]For a detailed discussion of the impact of transition on well-being, see Gruen and Klasen (2001, 2005).

was ahead in the Dagum measure in 1970, and both Gini-based measures in 1980. As is well-known, in the late 1970s China embarked on market reforms that led to extremely rapid growth that has been sustained to this day. In India, growth also accelerated in the 1980s, but never reached China's rates. Conversely, China experienced a larger increase in inequality that accompanied this growth than India, so that inequality levels are now very similar. Thus by 1990, China has overtaken India in per capita incomes and remains ahead in Gini-based measures but rising inequality in China, due to particularly slower growth among China's poorest keeps India ahead when the Atkinson ($\varepsilon = 2$) measure is used. But continued much faster income growth in China and rising inequality in India in the 1990s ensures that by 2000 China is firmly ahead of India in all welfare measures.

5 Sensitivity analysis

Given the problems of quality and comparability of the inequality data used, the robustness of our findings is checked using two different approaches. First, we simultaneously replace Gini coefficients and quintile shares for all countries where we have two observations from the same year (usually either based on a different data source or a different income concept) and where the two data points differ considerably. In Table 11 in the appendix we show that these changes do affect rankings of individual countries where the differences in the observations were particularly sizable but they do not affect any of the qualitative findings presented in the last section.

Secondly, due to the concerns about the regression-based adjustment procedure for the Gini coefficients and income shares (e.g. Atkinson and Brandolini, 2001), we also reproduced all results using the unadjusted Gini coefficients. Also here, there are individual changes in rankings and also the relative position of regions is somewhat affected. For example, inequality-adjusted well-being in Latin America is now even worse due to the reliance on income surveys there, while in many other regions (particularly in Africa and Asia) expenditure surveys are used which as confirmed by our regression analysis, tend to report more equal incomes. Thus our findings about Latin America would be even more dramatic if we did not adjust for different income concepts. Also the failure to adjust for different measurement concepts leads to more noise in the data and thus somewhat more rank changes at any one time and over time.[20] We believe that this problem is a major argument for making such a regression-based adjustment although we agree that this adjustment is far from perfect and might not fully address the incomparability problems. But we are reassured that, when using these data, all the substantive findings of this paper are qualitatively the same.

6 Conclusion

Most theories of well-being as well as an overwhelming array of experimental and empirical literature imply a negative impact of inequality on aggregate welfare. Nevertheless,

[20]See appendix Table 12 for more details. Using the unadjusted data leads particularly to larger rank changes using the Atkinson ($\varepsilon = 2$) measure. This is to be expected as income of the poorest quintile have a large impact on this measure and are quite sensitive to the measurement concept used.

this insight is rarely used for international and intertemporal comparisons of welfare. In this paper we combine the insights from this literature with newly available internationally comparable data of per capita income and its distribution to demonstrate the impact of considering inequality in international and intertemporal welfare assessments. The impression of aggregate welfare derived from inequality-adjusted measures drastically differs from the one obtained when looking at the mean incomes alone. We want to highlight five findings in particular.

First, using plausible adjustments for inequality that are consistent with the literature on risk, inequality aversion and subjective well-being, our measures show, compared to per capita incomes, dramatically reduced levels of welfare where the type of inequality has a significant impact on the welfare reduction implied by it. This is reflected by the differences in our results using the Atkinson versus the Gini-based measures. In particular, the conceptually and axiomatically more elegant Atkinson measures suggest particularly low welfare levels in Latin America, particularly when compared to industrialized and transition countries, while the empirically more plausible Gini-based measures show significantly smaller differences. Second, the ranking of countries is significantly affected by inequality-adjustments. While it particularly affected the ranks of middle income countries, more recently it has had a very large impact on the ranks of industrialized countries. Third, rank changes using our welfare measures (compared to per capita income ranks) have increased over time, particularly due to divergence in inequality trends in rich countries. Fourth, gaps between industrialized and developing countries are typically much larger using our inequality-adjusted measures, while convergence of East and South Asia (and divergence in Latin America and Sub Saharan Africa) is smaller in welfare than in per capita terms. Lastly, the pairwise country comparisons show even stronger impacts of the impact of diverging inequality on aggregate welfare. Of particular note is that rising inequality in the USA, Brazil, Russia, and China have negatively affected their welfare rankings over time.

Clearly, inequality matters for welfare comparisons and we hope that this empirical assessment will contribute to further debates and research about the measurement and interpretation of inequality, the causes of inequality trends, and its relationship to policy and other economic developments.

Table 1: **Average welfare by region, 2000**

	GDP/cap	**A1**		**A2**		**Sen**		**Dagum**	
Sub-Saharan Africa	1730	66.6	(1153)	46.7	(843)	48.6	(857)	32.4	(577)
South Asia	2566	77.8	(1996)	63.7	(1635)	59.1	(1518)	42.0	(1079)
Middle East & North Africa	5011	70.3	(3521)	52.3	(2621)	53.0	(2657)	36.5	(1829)
Latin America & Caribbean	7429	57.1	(4245)	35.8	(2658)	41.9	(3113)	26.6	(1976)
Europe & Central Asia	7791	76.8	(5984)	60.5	(4717)	59.0	(4600)	42.1	(3281)
East Asia & Pacific	4762	76.0	(3622)	59.5	(2832)	58.0	(2763)	41.0	(1951)
High income countries	29616	78.6	(23281)	62.5	(18523)	60.3	(17866)	43.3	(12828)

Note: Based on 101 countries analysed in 2000, weighted by population size. Column 1 presents average real GDP per capita, international dollars in constant 2000 prices (Heston, Summers, and Aten, 2002). Columns 2-5 show the average ratio (absolute value) of the respective adjusted income to unadjusted GDP per capita per region in %.
For individual countries, see Table 6.

Table 2: **Rank changes over time: Inequality-adjusted welfare measures compared to GDP per capita**

	No change	**1-2 Rank changes**	**3+ Rank changes**
1970			
A1	18	21	3
Sen	13	23	6
A2	12	19	11
Dagum	10	21	11
1980			
A1	17	18	7
Sen	15	21	6
A2	8	23	11
Dagum	12	23	7
1990			
A1	11	25	6
Sen	11	23	8
A2	9	19	14
Dagum	9	22	11
2000			
A1	12	21	9
Sen	12	17	13
A2	8	12	22
Dagum	10	15	17

Note: For the analysis of rank changes, a consistent sample of 42 countries has been constructed. Adjusted Gini coefficients and quintile shares were used to calculate distribution-sensitive welfare measures.

Figure 1: **Generalized Lorenz curves, 2000**

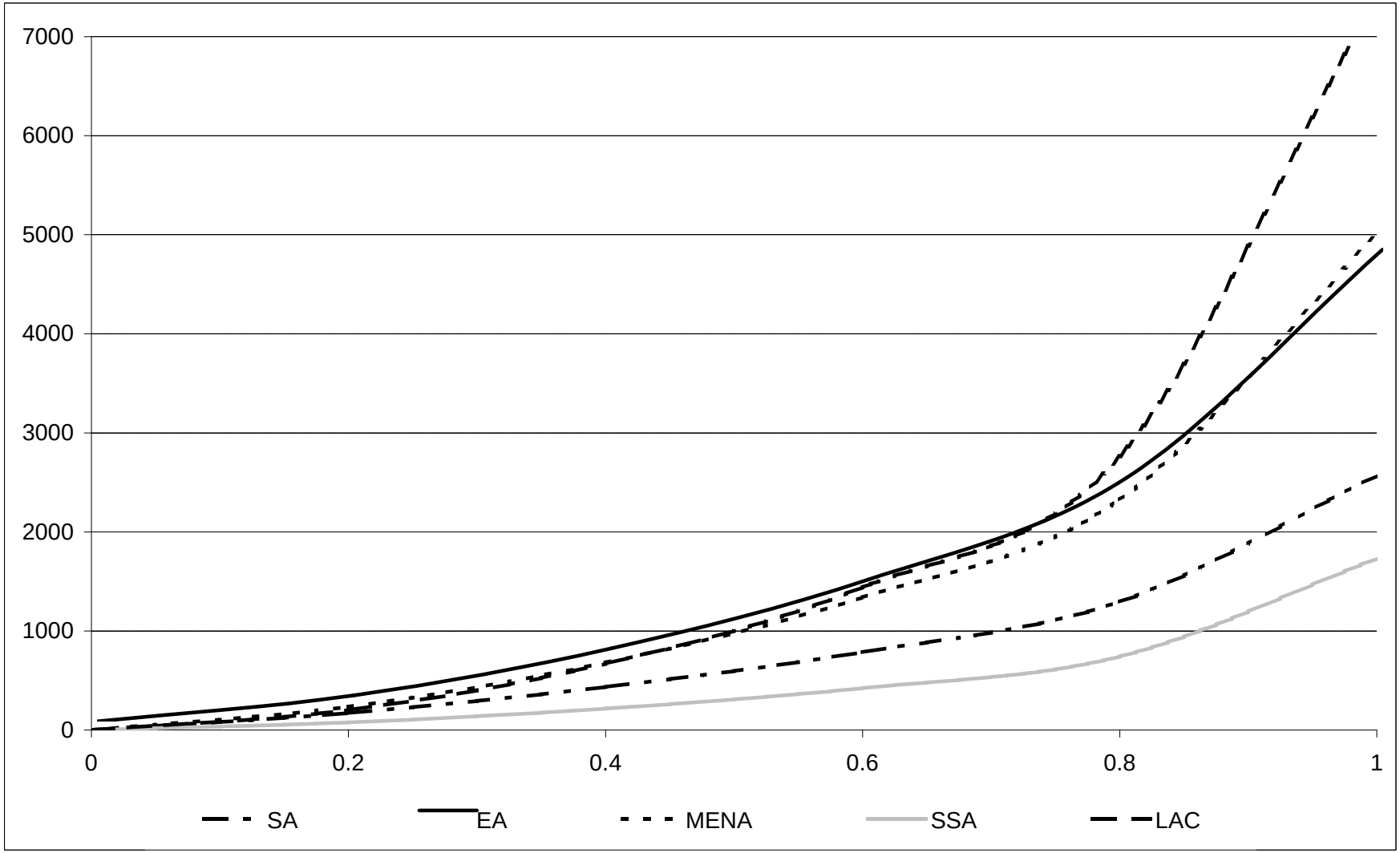


Figure 2: **Welfare measures by region, 1970-2000**

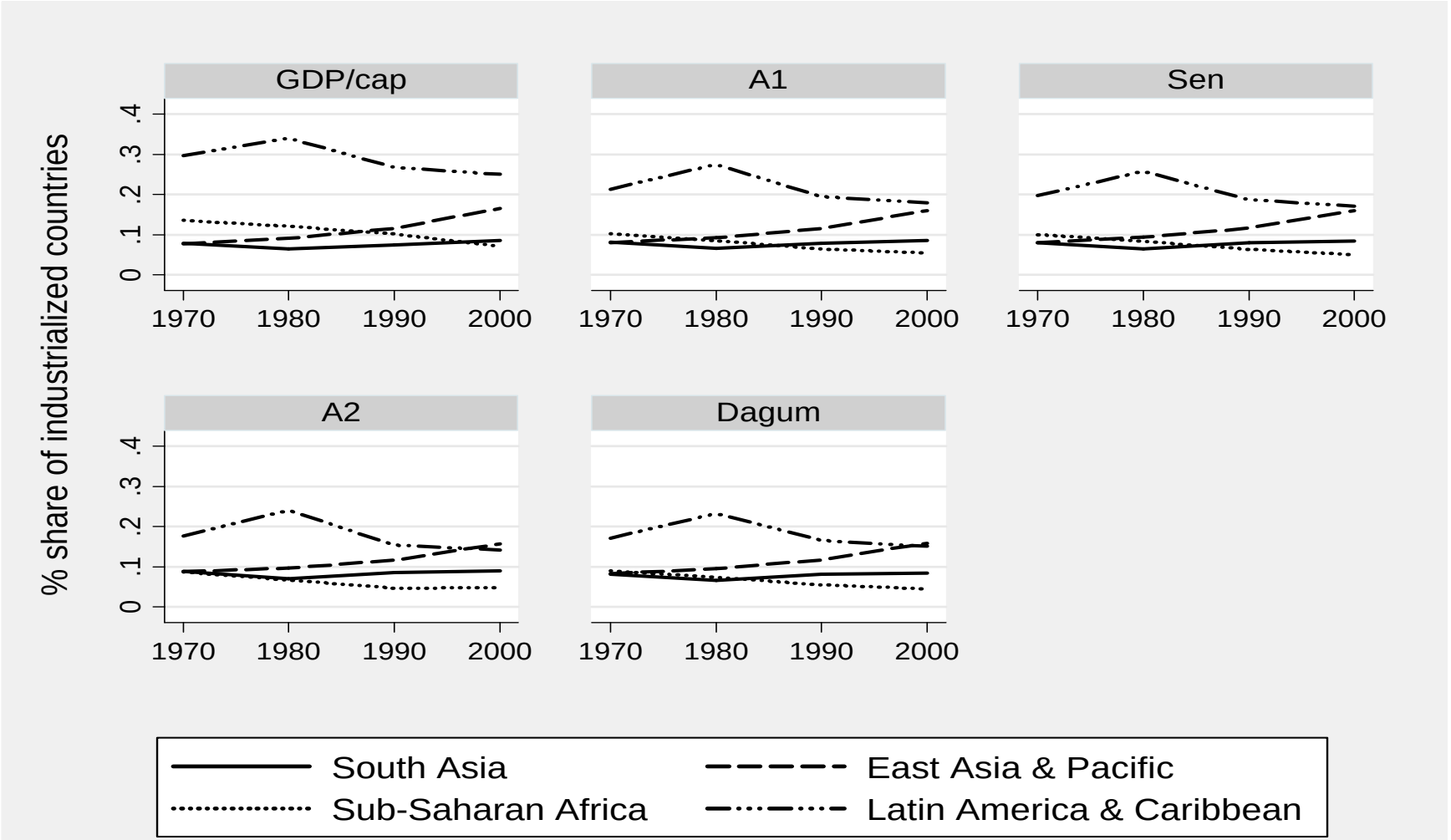
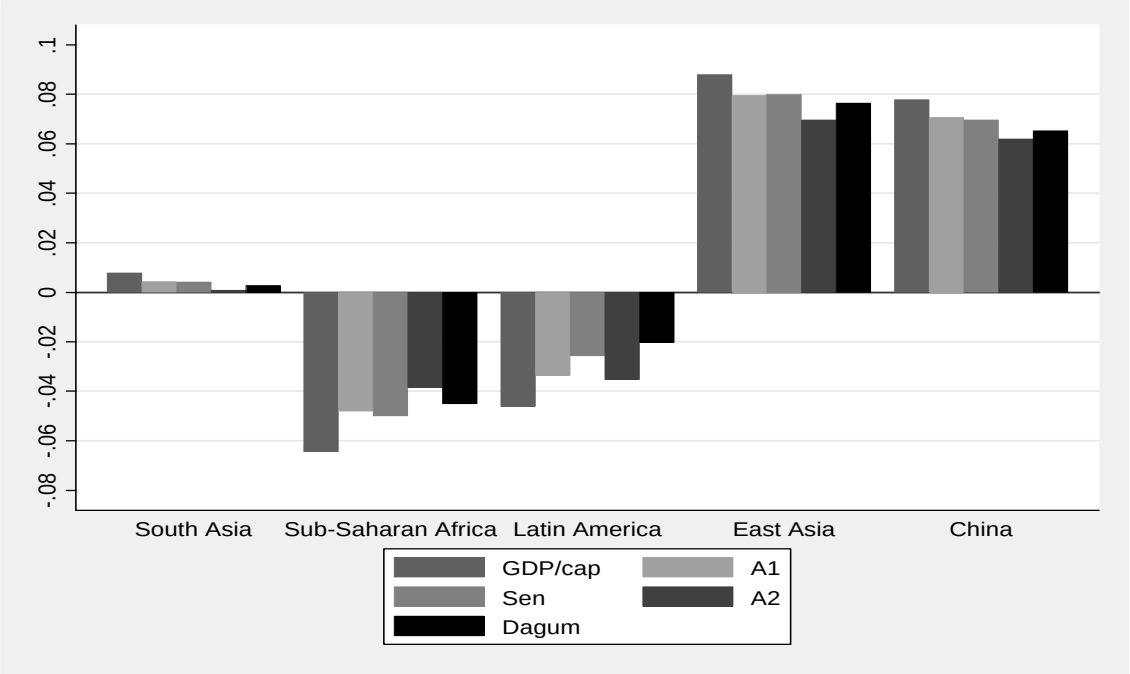
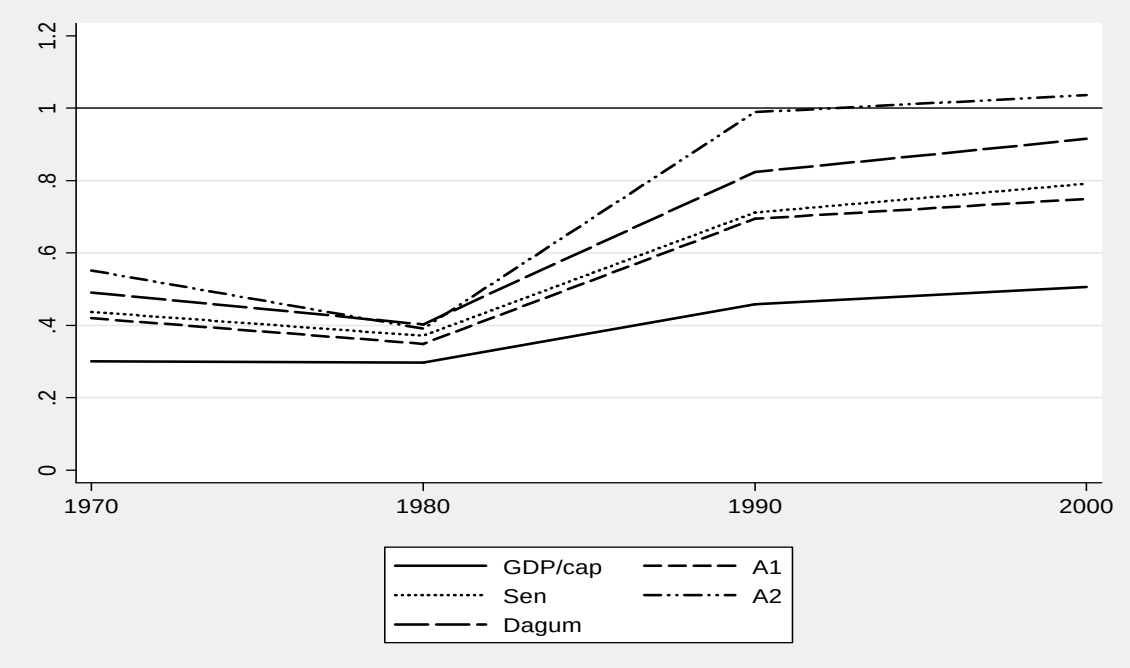


Figure 3: **Relative welfare changes by region, 1970-2000**



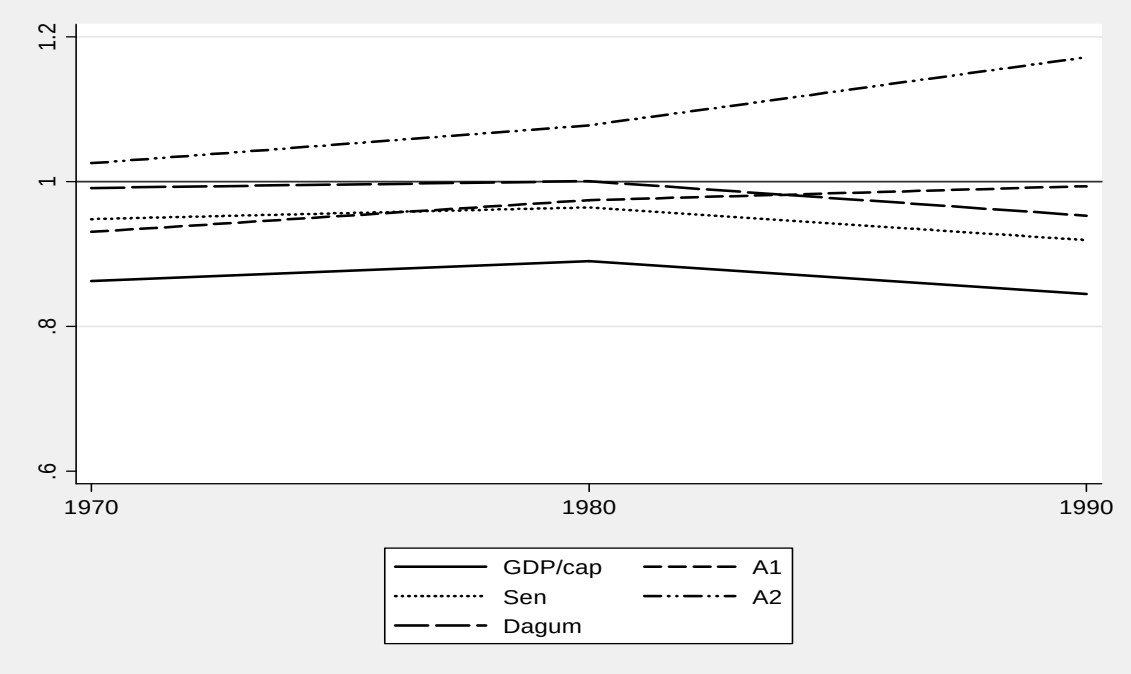
Note: The bars refer to the change in percentile between 1970 and 2000 of a region's welfare relative to the respective level in industrialized countries. The absolute percentiles in 1970 and 2000 can be seen in Figure 2.

Figure 4: **Relative welfare comparison: Indonesia versus Brazil, 1970-2000**



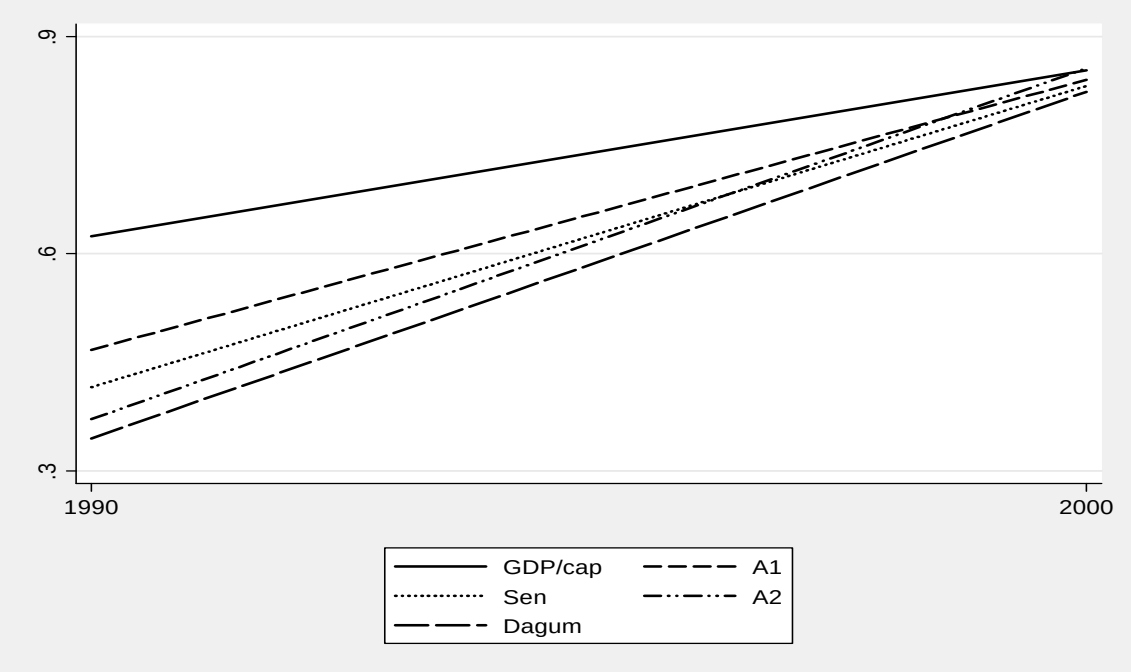
Note: Indonesia's welfare measures are expressed in relation to Brazil's respective welfare measures.

Figure 5: **Relative welfare comparison: Canada versus USA, 1970-1990**



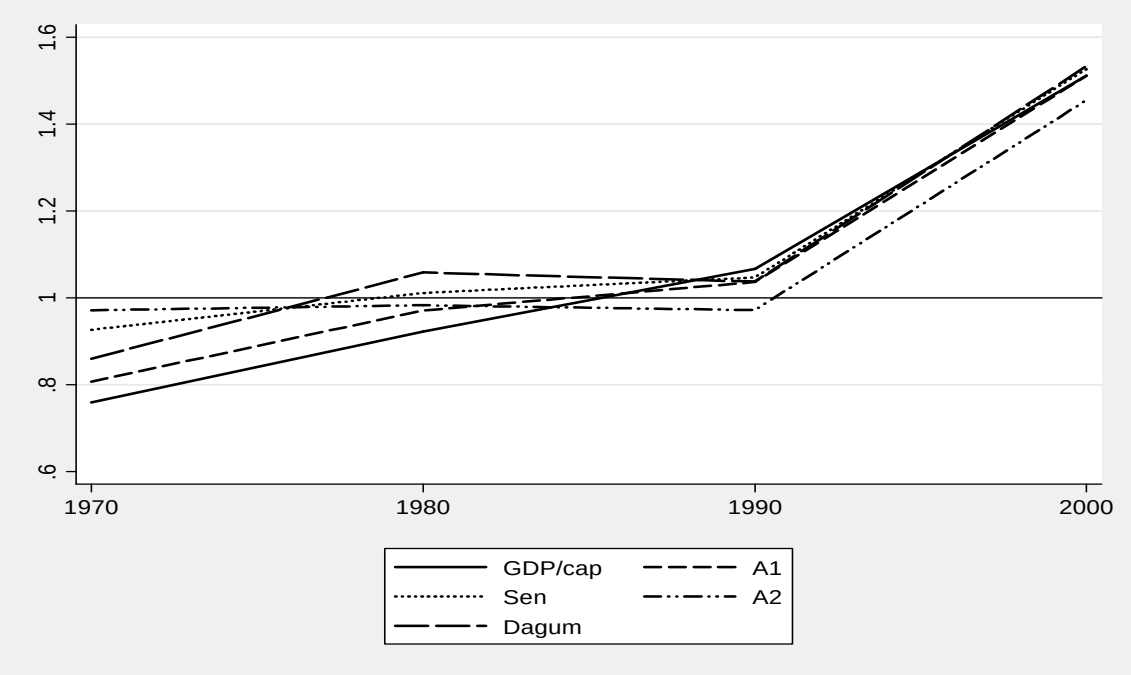
Note: Canada's welfare measures are expressed in relation to the respective welfare measures of the USA.

Figure 6: **Relative welfare comparison: Turkey versus Russia, 1990-2000**



Note: Turkey's welfare measures are expressed in relation to the respective welfare measures of Russia.

Figure 7: **Relative welfare comparison: China versus India, 1970-2000**



Note: China's welfare measures are expressed in relation to the respective welfare measures of India.

7 Appendix

Table 3: **Sample composition and Gini coefficients, 1970-2000**

Country	Code	Region	1970	1980	1990	2000
Albania	ALB	-	-	-	-	28.1 (33.4)
Algeria	DZA	-	-	-	39.9 (45.2)	35.4 (40.7)
Australia	AUS‡	HIC	31.8 (32.9)	40.0 (43.8)	33.2 (35.8)	44.6 (48.4)
Austria	AUT	-	-	-	27.0 (34.3)	23.7 (31.0)
Bahamas	BHS	-	-	-	-	44.1 (44.1)
Bangladesh	BGD‡	SA	36.9 (36.9)	38.3 (38.3)	33.6 (33.6)	31.7 (37.0)
Belarus	BLR	-	-	-	22.7 (22.7)	28.8 (30.0)
Belgium	BEL‡	HIC	28.2 (30.9)	24.7 (27.3)	25.2 (27.8)	32.2 (34.8)
Bolivia	BOL†	LAC	54.7 (54.7)	-	57.3 (57.3)	-
Brazil	BRA‡	LAC	60.6 (61.1)	52.6 (52.6)	60.5 (60.5)	61.2 (61.2)
Bulgaria	BGR	-	-	-	23.3 (23.3)	49.3 (49.3)
Cambodia	KHM	-	-	-	46.0 (51.3)	44.5 (49.8)
Cameroon	CMR	-	-	-	50.8 (56.1)	44.2 (49.5)
Canada	CAN‡	HIC	32.2 (33.3)	30.9 (34.7)	33.9 (37.7)	32.4 (35.0)
Chile	CHL	-	-	-	55.8 (57.0)	59.5 (60.7)
China	CHN‡	EA	29.9 (29.9)	29.5 (30.6)	35.7 (36.1)	40.3 (40.7)
Colombia	COL‡	LAC	57.3 (57.3)	54.0 (55.1)	50.8 (51.9)	57.4 (57.4)
Costa Rica	CRI‡	LAC	44.3 (48.1)	47.6 (48.8)	47.6 (47.6)	50.1 (50.1)
Cote d'Ivoire	CIV‡	SSA	44.2 (45.3)	50.6 (55.9)	45.9 (51.2)	44.4 (49.7)
Czech Republic	CZE	-	-	-	20.6 (23.2)	25.7 (28.3)
Denmark	DNK‡	HIC	31.6 (34.3)	31.0 (32.1)	25.0 (27.6)	39.2 (43.0)
Djibouti	DJI	-	-	-	-	48.5 (53.8)
Dominican Republic	DOM	-	-	43.4 (43.9)	50.2 (51.4)	47.5 (48.7)
Ecuador	ECU†	LAC	38.0 (39.1)		43.7 (49.0)	58.8 (60.0)
Egypt	EGY	-	37.4 (42.7)	-	31.9 (37.2)	54.2 (54.6)
El Salvador	SLV‡	LAC	46.5 (48.0)	47.8 (48.9)	52.6 (53.8)	53.8 (55.0)
Estonia	EST	-	-	-	35.5 (41.9)	36.4 (37.6)
Ethiopia	ETH	-	-	-	52.7 (52.7)	29.7 (35.0)
Finland	FIN‡	HIC	29.7 (37.1)	23.3 (30.6)	22.8 (30.1)	27.0 (29.6)
France	FRA‡	HIC	35.2 (37.8)	31.4 (34.0)	32.7 (35.3)	28.2 (35.5)

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Table 3: *continued*

Country	**Code**	**Region**	**1970**	**1980**	**1990**	**2000**
The Gambia	GMB	-	-	-	47.5 (52.8)	50.2 (55.5)
Ghana	GHA	-	-	-	36.0 (41.3)	40.7 (46.0)
Greece	GRC‡	HIC	35.2 (41.6)	33.4 (39.8)	35.1 (41.5)	32.3 (39.6)
Guatemala	GTM	-	-	-	59.4 (60.6)	59.8 (61.0)
Guinea	GIN	-	-	-	-	55.1 (60.4)
Guinea-Bissau	GNB	-	-	-	-	44.3 (49.6)
Guyana	GUY	-	-	-	54.0 (54.0)	44.2 (49.5)
Honduras	HND†	LAC	62.0 (62.4)	-	54.6 (55.8)	52.7 (53.9)
Hong Kong	HKG‡	EA	43.8 (43.8)	39.4 (39.4)	43.4 (43.4)	51.4 (51.4)
Hungary	HUN‡	-	23.8 (26.4)	20.9 (23.5)	29.5 (32.1)	30.1 (32.7)
India	IND‡	SA	30.2 (35.5)	31.4 (36.7)	29.6 (34.9)	36.0 (41.3)
Indonesia	IDN‡	EA	43.3 (43.3)	34.4 (40.8)	38.7 (38.7)	34.1 (39.4)
Iran	IRN	-	-	-	-	44.0 (49.3)
Ireland	IRL‡	HIC	37.4 (40.1)	36.6 (39.3)	36.0 (38.7)	30.1 (37.4)
Israel	ISR	-	-	36.3 (37.5)	35.3 (36.5)	37.2 (38.4)
Italy	ITA‡	HIC	39.0 (41.7)	37.5 (40.2)	32.2 (34.8)	35.8 (38.4)
Jamaica	JAM‡	LAC	45.7 (51.0)	43.0 (48.3)	50.7 (50.7)	54.0 (54.0)
Jordan	JOR	-	-	-	43.0 (48.3)	36.3 (41.6)
Kazakhstan	KAZ	-	-	-	32.7 (32.7)	31.3 (36.6)
Kenya	KEN	-	-	57.0 (58.2)	56.9 (62.2)	44.5 (49.8)
Republic of Korea	KOR†	EA	38.2 (38.7)	-	34.9 (39.6)	37.2 (41.9)
Laos	LAO	-	-	-	-	36.5 (41.8)
Latvia	LVA	-	-	-	27.0 (27.4)	34.6 (35.8)
Lithuania	LTU	-	-	-	33.3 (33.7)	33.0 (38.3)
Luxembourg	LUX	-	-	26.4 (29.0)	26.5 (29.1)	30.3 (32.9)
Madagascar	MDG‡	SSA	53.0 (53.0)	46.7 (52.0)	62.5 (62.5)	47.4 (52.7)
Malawi	MWI‡	SSA	46.1 (46.6)	57.3 (57.7)	42.5 (42.5)	49.3 (54.6)
Malaysia	MYS‡	EA	51.4 (51.9)	50.6 (50.6)	48.0 (48.0)	50.0 (50.0)
Mali	MLI	-	-	-	36.5 (41.8)	54.0 (59.3)
Mauritania	MRT	-	-	-	-	39.0 (44.3)
Mexico	MEX‡	LAC	57.4 (57.9)	50.6 (53.2)	54.8 (57.4)	55.6 (58.2)
Moldova	MDA	-	-	-	34.4 (34.8)	40.5 (41.7)
Mongolia	MNG	-	-	-	-	44.0 (49.3)
Morocco	MRC‡	-	55.0 (56.1)	38.9 (44.2)	39.2 (44.5)	39.4 (44.7)

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Table 3: *continued*

Country	**Code**	**Region**	**1970**	**1980**	**1990**	**2000**
Mozambique	MOZ	-	-	-	-	39.4 (44.7)
Nepal	NPL†	SA	52.2 (52.2)	30.0 (31.2)	-	54.6 (54.6)
The Netherlands	NLD‡	HIC	28.1 (30.8)	32.6 (35.2)	25.8 (33.1)	25.5 (32.8)
Nicaragua	NIC	-	-	-	55.7 (56.9)	55.5 (56.7)
Nigeria	NGA‡	SSA	51.6 (52.7)	51.2 (51.2)	57.2 (57.2)	50.2 (55.5)
Norway	NOR‡	HIC	30.5 (37.8)	31.3 (38.6)	33.5 (36.2)	36.5 (39.2)
Pakistan	PAK‡	SA	32.9 (33.4)	32.0 (38.4)	33.2 (38.5)	31.0 (36.3)
Panama	PAN‡	LAC	58.7 (58.7)	47.6 (48.7)	58.4 (59.6)	57.8 (59.0)
Papua New Guinea	PNG	-	-	-	-	50.4 (55.7)
Paraguay	PRY	-	-	-	62.1 (62.1)	57.7 (57.7)
Peru	PER†	LAC	58.7 (59.2)	-	42.4 (47.7)	50.9 (52.1)
Philippines	PHL‡	EA	49.1 (49.1)	41.0 (46.3)	50.9 (50.9)	49.5 (53.3)
Poland	POL	-	-	25.6 (28.2)	28.3 (33.6)	31.9 (34.5)
Portugal	PRT‡	HIC	40.1 (40.1)	34.1 (36.7)	38.0 (43.3)	34.7 (42.0)
Romania	ROM	-	-	-	23.3 (23.3)	29.4 (34.7)
Russia	RUS	-	-	-	23.9 (23.9)	42.5 (43.7)
Senegal	SEN	-	-	-	-	41.0 (46.3)
Slovak Republic	SVK	-	-	-	19.6 (22.2)	26.0 (28.6)
Slovenia	SVN	-	-	-	23.5 (24.7)	23.9 (25.1)
South Africa	ZAF†	SSA	56.3 (56.3)	-	59.5 (64.8)	60.1 (60.1)
Spain	ESP‡	HIC	36.2 (38.9)	34.4 (37.0)	31.7 (34.3)	31.5 (38.8)
Sri Lanka	LKA‡	SA	30.9 (36.2)	44.5 (44.5)	35.8 (41.1)	61.0 (61.0)
Sweden	SWE‡	HIC	30.7 (33.4)	32.6 (36.3)	23.0 (30.3)	29.2 (36.5)
Switzerland	CHE	-	-	-	35.9 (37.1)	17.4 (17.4)
Taiwan	TWN‡	EA	29.9 (31.1)	27.7 (28.9)	30.9 (32.1)	31.2 (32.4)
Tanzania	TZA†	SSA	43.3 (44.5)	-	58.9 (64.2)	36.7 (42.0)
Thailand	THA‡	EA	43.8 (43.8)	48.3 (48.3)	54.9 (54.9)	58.5 (58.5)
Tunisia	TUN‡	-	42.3 (48.7)	43.3 (48.6)	40.1 (45.4)	40.6 (45.9)
Turkey	TUR‡	-	51.5 (54.2)	46.5 (49.1)	46.7 (49.3)	39.8 (45.1)
Uganda	UGA	-	-	-	52.2 (52.2)	54.6 (54.6)
Ukraine	UKR	-	-	-	23.3 (23.3)	34.4 (39.7)
United Kingdom	GBR‡	HIC	25.4 (32.7)	25.2 (32.5)	33.5 (40.8)	34.6 (41.9)
USA	USA‡	HIC	39.3 (39.3)	39.7 (39.7)	42.7 (42.7)	39.4 (42.0)
Uzbekistan	UZB	-	-	-	28.0 (28.0)	48.1 (49.3)

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Table 3: *continued*

Country	**Code**	**Region**	**1970**	**1980**	**1990**	**2000**
Venezuela	VEN	-	-	-	-	45.8 (47.0)
Vietnam	VNM	-	-	-	34.4 (39.7)	37.3 (42.6)
Yemen	YEM	-	-	-	39.3 (44.6)	21.8 (27.1)
Zambia	ZMB†	SSA	48.1 (48.1)	55.6 (55.6)	-	66.6 (66.6)

Notes: Adjusted Gini coefficients are in parentheses. Data have been retrieved from WIID (2005). All countries with a valid entry for 2000 entered the welfare calculation in that year.
‡: Countries are part of both the consistent country sample 1970-2000 (42 countries) and the regional consistent sample 1970-2000.
†: Countries are part of the regional consistent sample 1970-2000, used in Figures 2 and 3.
In case of a missing entry in the country consistent sample (42 countries), data of lower quality or interpolated data have been used.
EA: East Asia & Pacific; LAC: Latin America & Caribbean; SA: South Asia;
SSA: Sub-Saharan Africa; HIC: High income countries.

Table 4: **Sensitivity of Gini coefficients to measurement concept**

	Coefficient	**SE**
Expenditure/Consumption	-5.30**	(0.40)
Disposable income	-1.19*	(0.49)
Income concept unknown	-0.42	(0.41)
Family	-3.75**	(0.62)
No equivalence scale	-0.05	(0.37)
Other equivalence scale	-4.72**	(0.51)
Income sharing unit and equivalence scale unknown	-1.11*	(0.46)
1950s	0.40	(0.74)
1960s	-1.04*	(0.46)
1970s	-1.64**	(0.40)
1980s	-2.36**	(0.32)
TRANS * 1960s	-6.50**	(1.49)
TRANS * 1970s	-8.16**	(1.34)
TRANS * 1980s	-5.61**	(1.03)
TRANS * 1990s	-1.19	(0.73)
OECD * disposable income	-1.45*	(0.64)
Intercept	42.16**	(0.38)
N	2268	
R^2	0.22	

Notes: Country fixed effects regression. Standard errors in parentheses.

Reference category: Gross income per capita. TRANS: transition countries.

Significance levels: $*$: 5% $**$: 1%

Table 5: **Sensitivity of quintile shares to measurement concept**

	1st quintile		**2nd quintile**		**3rd quintile**		**4th quintile**	
Expenditure/Consumption	1.11**	(0.12)	1.32**	(0.13)	1.63**	(0.12)	1.49**	(0.14)
Disposable income	0.25	(0.19)	0.36	(0.21)	0.63**	(0.19)	0.67**	(0.22)
Income concept unknown	0.34*	(0.16)	-0.04	(0.17)	-0.05	(0.15)	0.13	(0.18)
Family	0.55*	(0.26)	0.49	(0.28)	0.15	(0.26)	0.34	(0.30)
No equivalence scale	-0.46**	(0.12)	-0.15	(0.13)	0.32**	(0.12)	0.88**	(0.14)
Other equivalence scale	1.28**	(0.16)	1.16**	(0.18)	0.71**	(0.16)	-0.00	(0.19)
Income sharing unit and equivalence scale unknown	0.36*	(0.16)	0.18	(0.17)	0.36	(0.16)	0.58**	(0.18)
1950s	0.04	(0.24)	-0.16	(0.26)	-0.83**	(0.24)	-1.22**	(0.27)
1960s	0.36*	(0.15)	0.31	(0.16)	-0.06	(0.15)	-0.55**	(0.17)
1970s	0.32**	(0.12)	0.34*	(0.13)	0.19	(0.12)	-0.11	(0.14)
1980s	0.37**	(0.10)	0.49**	(0.11)	0.39**	(0.10)	0.36**	(0.12)
TRANS * 1960s	2.82**	(0.66)	2.65**	(0.71)	2.75**	(0.66)	1.25	(0.75)
TRANS * 1970s	3.52**	(0.63)	2.18**	(0.67)	3.59**	(0.62)	1.69*	(0.71)
TRANS * 1980s	3.26**	(0.56)	2.56**	(0.60)	2.57**	(0.56)	1.33*	(0.64)
TRANS * 1990s	1.12*	(0.53)	0.82	(0.57)	1.05*	(0.53)	0.78	(0.60)
OECD * disposable income	0.18	(0.24)	0.12	(0.26)	0.23	(0.24)	0.15	(0.28)
Intercept	5.48**	(0.13)	9.88**	(0.14)	14.00**	(0.13)	20.49**	(0.15)
N	1432		1432		1432		1432	
R^2	0.22		0.17		0.21		0.14	

Notes: Country fixed effects regression. Standard errors in parentheses.
Reference category: Gross income per capita. TRANS: transition countries.
Significance levels: $*$: 5% $**$: 1%

Table 6: **Welfare measures, 2000**

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
101	TZA	527	TZA	76.3	TZA	58.0	ZMB	24.0	ZMB	20.0
100	ETH	695	ZMB	45.9	ZMB	33.4	NGA	40.4	TZA	40.8
99	GNB	753	NGA	60.7	NGA	44.5	TZA	60.6	NGA	28.6
98	NGA	774	GNB	68.2	GNB	50.4	MLI	30.2	MWI	29.4
97	MWI	858	MWI	62.3	MWI	45.4	MWI	43.6	GNB	33.7
96	YEM	894	MLI	53.4	MLI	40.7	GNB	49.9	MLI	25.6
95	MDG	915	ETH	83.4	MDG	47.3	MDG	44.3	MDG	31.0
94	ZMB	976	MDG	63.7	ETH	65.0	UGA	43.7	UGA	29.4
93	UGA	1030	UGA	63.1	UGA	45.4	GMB	37.4	ETH	48.2
92	MLI	1061	GMB	58.9	GMB	44.5	ETH	71.9	GMB	28.6
91	MOZ	1135	YEM	89.0	MOZ	55.3	NPL	34.6	MOZ	38.2
90	GMB	1332	MOZ	73.8	YEM	72.9	MOZ	57.3	KEN	33.5
89	KEN	1362	KEN	67.7	KEN	50.2	NIC	34.6	KHM	33.5
88	MNG	1388	NPL	59.4	KHM	50.2	KEN	49.7	NPL	29.4
87	KHM	1393	MNG	68.5	MNG	50.7	MNG	50.6	MNG	34.0
86	MRT	1439	KHM	68.5	NPL	45.4	YEM	79.1	YEM	57.4
85	GHA	1478	GHA	71.1	GHA	54.0	KHM	51.9	NIC	27.6
84	LAO	1497	MRT	73.4	MRT	55.7	GHA	52.3	GHA	37.0
83	NPL	1597	NIC	57.6	NIC	43.3	MRT	56.1	MRT	38.6
82	SEN	1775	LAO	77.1	LAO	58.2	DJI	37.2	LAO	41.0
81	BGD	1843	SEN	72.3	SEN	53.7	HND	38.5	SEN	36.7
80	NIC	1934	HND	60.9	CIV	50.3	GIN	30.3	HND	30.0
79	VNM	1984	CIV	67.8	HND	46.1	LAO	62.8	CIV	33.6
78	CIV	2046	DJI	60.4	DJI	46.2	SEN	55.8	DJI	30.0
77	PAK	2197	BGD	81.7	CMR	50.5	CIV	49.6	CMR	33.8
76	CMR	2235	VNM	76.1	VNM	57.4	ECU	28.8	GIN	24.7
75	HND	2244	CMR	67.9	BGD	63.0	CMR	49.8	VNM	40.3
74	MDA	2283	GIN	52.6	GIN	39.6	VNM	61.4	BGD	46.0
73	DJI	2302	MDA	76.1	MDA	58.3	LKA	33.8	LKA	24.2
72	IND	2713	PAK	82.7	PAK	63.7	GTM	29.5	PNG	28.5
71	UZB	3069	PNG	60.1	LKA	39.0	BGD	69.7	MDA	41.2
70	GIN	3098	ECU	52.7	PNG	44.3	PNG	40.5	ECU	25.0
69	PNG	3198	LKA	55.4	ECU	40.0	UZB	43.9	PAK	46.7
68	LKA	3612	UZB	66.1	UZB	50.7	MDA	59.0	GTM	24.2
67	ALB	3663	IND	77.4	IND	58.7	JAM	37.2	UZB	34.0
66	PHL	3749	GTM	52.0	GTM	39.0	PRY	29.6	IND	41.5
65	ECU	3795	JAM	60.7	PHL	46.7	PAK	71.5	PHL	30.5
64	GUY	3955	PHL	66.8	JAM	46.0	SLV	33.2	JAM	29.9
63	IDN	3987	GUY	66.3	GUY	50.5	IND	63.1	GUY	33.8
62	JAM	4042	PRY	54.7	EGY	45.4	GUY	44.8	EGY	29.4
61	MRC	4068	SLV	57.8	PRY	42.3	PHL	48.3	PRY	26.8
60	CHN	4101	EGY	62.5	SLV	45.0	EGY	42.0	SLV	29.0
59	JOR	4263	MRC	73.4	MRC	55.3	PAN	29.7	MRC	38.2
58	GTM	4284	ALB	84.7	PER	47.9	COL	34.2	PER	31.5
57	EGY	4579	IDN	79.4	IDN	60.6	PER	45.1	COL	27.1
56	ROM	4690	CHN	77.4	CHN	59.3	THA	30.4	PAN	25.8
55	SLV	4854	PER	64.9	ALB	66.6	MRC	56.9	CHN	42.1
54	PER	5023	JOR	77.3	JOR	58.4	CHN	60.8	IDN	43.5
53	UKR	5059	COL	57.2	COL	42.6	BRA	32.5	JOR	41.2
52	PRY	5126	PAN	53.3	PAN	41.0	IDN	66.5	ALB	49.9
51	DZA	5358	ROM	83.5	DOM	51.3	ALB	73.2	BRA	24.1
50	DOM	5768	UKR	78.6	UKR	60.3	JOR	62.9	THA	26.2

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Table 6: *continued*

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
49	COL	5892	DOM	69.1	BRA	38.8	DOM	50.9	DOM	34.5
48	BGR	6332	THA	54.4	ROM	65.3	CRI	46.2	ZAF	24.9
47	CRI	6425	DZA	77.4	THA	41.5	IRN	47.8	CRI	33.2
46	IRN	6561	BRA	53.7	DZA	59.3	BGR	50.4	BGR	34.0
45	PAN	6640	CRI	66.9	CRI	49.9	UKR	63.3	UKR	43.2
44	VEN	7027	BGR	69.5	BGR	50.7	DZA	61.7	IRN	34.0
43	TUN	7417	IRN	67.4	ZAF	39.9	ZAF	40.3	DZA	42.2
42	TUR	7478	ZAF	58.1	IRN	50.7	ROM	71.4	ROM	48.5
41	THA	7505	VEN	69.6	VEN	53.0	VEN	49.5	MEX	26.4
40	BRA	7870	TUN	71.9	MEX	41.8	MEX	36.9	VEN	36.1
39	LTU	7939	TUR	72.7	TUN	54.1	CHL	34.2	CHL	24.5
38	KAZ	8090	MEX	57.9	TUR	54.9	TUN	54.3	TUN	37.1
37	ZAF	8254	CHL	54.4	CHL	39.3	TUR	55.3	TUR	37.8
36	LVA	8376	LTU	80.0	LTU	61.7	RUS	55.1	RUS	39.2
35	RUS	8766	RUS	73.8	RUS	56.3	LTU	65.9	LTU	44.6
34	BLR	9213	KAZ	81.6	KAZ	63.4	MYS	48.9	MYS	33.3
33	MEX	9590	LVA	82.4	LVA	64.2	KAZ	68.4	KAZ	46.4
32	POL	10088	MYS	68.0	MYS	50.0	LVA	68.8	LVA	47.3
31	EST	10495	BLR	87.8	BLR	70.0	EST	66.2	EST	45.4
30	MYS	10857	EST	80.6	EST	62.4	POL	71.8	POL	48.7
29	CHL	10864	POL	84.1	POL	65.5	BLR	78.7	BLR	53.9
28	HUN	11426	HUN	85.8	HUN	67.3	HUN	74.6	HUN	50.7
27	SVK	12488	SVK	88.8	SVK	71.4	KOR	49.3	GRC	43.2
26	CZE	14958	GRC	78.6	GRC	60.3	BHS	50.7	SVK	55.5
25	GRC	15995	KOR	72.9	KOR	58.1	GRC	61.3	BHS	38.7
24	SVN	17233	BHS	72.2	PRT	57.9	SVK	78.9	PRT	40.8
23	KOR	17376	CZE	89.3	BHS	55.9	PRT	59.7	KOR	40.9
22	PRT	17428	PRT	76.8	CZE	71.7	ISR	63.9	ISR	44.5
21	BHS	18090	ISR	79.4	ISR	61.6	CZE	80.6	CZE	55.8
20	ISR	18556	SVN	90.9	ESP	61.1	ESP	65.6	ESP	44.0
19	TWN	18668	ESP	80.3	TWN	67.6	AUS	48.3	HKG	32.1
18	ESP	19753	TWN	85.5	SVN	74.9	TWN	74.4	TWN	51.1
17	ITA	23839	GBR	77.4	GBR	58.0	HKG	48.7	AUS	34.8
16	GBR	24287	ITA	79.9	HKG	48.6	SVN	83.0	GBR	40.9
15	FRA	24471	AUS	69.9	AUS	51.6	GBR	61.4	SVN	59.9
14	SWE	25869	HKG	67.4	ITA	61.6	ITA	64.1	ITA	44.5
13	AUT	25914	FRA	82.7	FRA	64.4	FRA	69.8	DNK	39.9
12	BEL	26029	SWE	83.3	SWE	63.4	DNK	59.7	FRA	47.5
11	FIN	26041	BEL	84.4	DNK	57.0	SWE	71.5	SWE	46.5
10	NLD	26611	DNK	77.1	BEL	65.2	BEL	73.2	BEL	48.3
9	AUS	27975	AUT	87.7	AUT	68.9	NOR	64.7	NOR	43.7
8	IRL	28874	FIN	88.3	NLD	67.1	IRL	66.5	IRL	45.5
7	CHE	28910	NLD	87.1	NOR	60.8	AUT	77.2	NLD	50.5
6	DNK	29123	IRL	81.3	IRL	62.5	NLD	76.5	AUT	52.6
5	HKG	29222	NOR	79.8	FIN	70.4	FIN	78.9	FIN	54.3
4	CAN	29447	CAN	83.3	CAN	65.0	CAN	69.9	CAN	48.1
3	NOR	29618	USA	75.8	USA	58.0	USA	57.7	USA	40.8
2	USA	36440	CHE	95.8	CHE	82.6	CHE	91.8	CHE	70.3
1	LUX	48147	LUX	85.3	LUX	67.1	LUX	73.5	LUX	50.4

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 GDP per capita, PPP.

Table 7: **Welfare measures (consistent sample), 1970**

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
42	MWI	498	MWI	73.5	MWI	53.4	MWI	58.2	MWI	36.5
41	CHN	892	CHN	88.1	NGA	47.3	NGA	50.7	NGA	31.0
40	PAK	1032	NGA	65.3	CHN	70.1	MDG	47.9	MDG	30.7
39	IND	1175	PAK	85.6	MDG	47.0	CHN	78.5	IDN	39.5
38	IDN	1190	IDN	75.5	IDN	56.7	IDN	60.6	CHN	53.9
37	BGD	1209	MDG	65.6	PAK	66.6	PAK	74.8	PAK	50.0
36	NGA	1219	IND	82.9	IND	64.5	IND	70.8	BGD	46.0
35	MDG	1394	BGD	82.6	BGD	63.1	BGD	70.0	IND	47.6
34	LKA	1705	LKA	82.5	MRC	43.9	MRC	47.8	MRC	28.1
33	THA	1995	THA	75.7	LKA	63.8	THA	59.7	THA	39.0
32	MRC	2474	MRC	61.5	THA	56.2	LKA	70.4	LKA	46.8
31	CIV	2616	PHL	69.2	PHL	50.9	COL	35.1	PHL	34.1
30	PHL	2623	TUN	68.3	CIV	54.7	BRA	33.0	COL	27.1
29	TUN	2811	CIV	74.0	TUN	51.3	PHL	50.6	BRA	24.2
28	TWN	3053	COL	57.4	COL	42.7	PAN	33.1	TUN	34.5
27	MYS	3156	MYS	66.6	MYS	48.1	TUN	49.6	CIV	37.6
26	COL	3458	BRA	54.0	BRA	38.9	MYS	47.8	MYS	31.7
25	TUR	3961	PAN	55.4	PAN	41.3	CIV	61.6	PAN	26.0
24	BRA	3962	TUR	63.3	TUR	45.8	TUR	43.4	TUR	29.7
23	PAN	4185	TWN	86.8	JAM	49.0	JAM	44.1	JAM	32.4
22	JAM	4232	JAM	65.1	TWN	68.9	SLV	42.6	SLV	35.1
21	SLV	4532	SLV	66.3	SLV	52.0	TWN	76.6	TWN	52.5
20	CRI	4576	CRI	72.9	CRI	51.9	CRI	56.1	CRI	35.0
19	HUN	5879	MEX	60.4	MEX	42.1	MEX	43.3	MEX	26.7
18	MEX	6044	HUN	90.5	HKG	56.2	HKG	61.3	HKG	39.0
17	PRT	6891	HKG	76.0	PRT	59.9	PRT	64.0	PRT	42.7
16	HKG	7121	PRT	79.0	HUN	73.6	IRL	59.7	IRL	42.8
15	IRL	7946	IRL	77.6	IRL	59.9	HUN	82.2	HUN	58.2
14	GRC	9239	GRC	75.3	GRC	58.4	GRC	57.4	GRC	41.2
13	ESP	9934	ESP	79.8	ESP	61.1	ESP	64.4	ESP	44.0
12	NOR	12245	ITA	76.6	ITA	58.3	NOR	58.8	ITA	41.2
11	ITA	12361	NOR	78.5	NOR	62.1	ITA	59.1	NOR	45.1
10	FIN	12490	FIN	81.7	FIN	62.9	FIN	67.5	FIN	45.9
9	GBR	13227	FRA	80.9	FRA	62.2	FRA	66.9	FRA	45.1
8	BEL	13291	GBR	86.0	GBR	67.2	GBR	74.9	GBR	50.7
7	FRA	13502	BEL	87.0	BEL	69.1	BEL	75.9	BEL	52.8
6	NLD	14579	NLD	87.3	NLD	69.2	USA	57.6	NLD	52.9
5	CAN	15435	CAN	83.4	CAN	66.7	CAN	68.4	CAN	50.0
4	AUS	16221	AUS	84.3	SWE	66.6	NLD	76.7	USA	43.5
3	SWE	16229	SWE	84.3	USA	60.7	SWE	70.4	SWE	49.9
2	DNK	17553	USA	77.3	AUS	67.1	AUS	70.5	AUS	50.5
1	USA	17897	DNK	84.1	DNK	65.7	DNK	70.9	DNK	48.9

Table 8: **Welfare measures (consistent sample), 1980**

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
42	MWI	716	MWI	60.2	MWI	42.2	MWI	42.6	MWI	26.8
41	BGD	1065	MDG	64.9	MDG	48.0	MDG	45.5	MDG	31.6
40	CHN	1170	BGD	81.1	NGA	48.8	NGA	45.1	NGA	32.3
39	MDG	1190	NGA	65.6	BGD	61.7	BGD	67.8	BGD	44.6
38	PAK	1261	PAK	79.9	PAK	61.6	PAK	66.8	PAK	44.5
37	IND	1268	CHN	86.2	IND	63.3	CHN	74.0	IND	46.3
36	NGA	1330	IND	81.9	CHN	69.4	IND	69.5	CHN	53.1
35	LKA	1959	LKA	75.4	LKA	55.5	CIV	39.2	LKA	38.4
34	IDN	2075	IDN	77.0	CIV	44.1	LKA	60.8	CIV	28.3
33	CIV	2766	CIV	59.7	IDN	59.2	IDN	61.5	IDN	42.0
32	THA	2989	THA	69.4	THA	51.7	THA	50.2	THA	34.9
31	MRC	3277	MRC	74.4	MRC	55.8	COL	37.7	MRC	38.7
30	PHL	3600	PHL	72.1	PHL	53.7	JAM	50.2	JAM	34.9
29	JAM	3778	JAM	69.1	JAM	51.7	MRC	58.2	PHL	36.7
28	SLV	4552	COL	59.9	COL	44.9	PHL	55.6	COL	28.9
27	TUR	4676	SLV	68.1	SLV	51.1	SLV	49.7	SLV	34.3
26	COL	4719	TUR	69.2	TUR	50.9	TUR	50.9	TUR	34.1
25	TUN	4776	TUN	69.0	TUN	51.4	TUN	50.5	TUN	34.6
24	MYS	5337	MYS	67.6	MYS	49.4	CRI	42.3	MYS	32.8
23	PAN	5850	CRI	65.6	PAN	51.3	MYS	48.7	PAN	34.5
22	CRI	5931	PAN	67.8	CRI	51.2	PAN	47.3	CRI	34.4
21	TWN	6424	BRA	65.6	BRA	47.4	BRA	46.8	BRA	31.0
20	BRA	6983	MEX	63.9	MEX	46.8	MEX	44.1	MEX	30.5
19	MEX	8378	TWN	88.4	TWN	71.1	TWN	79.1	TWN	55.1
18	HUN	8971	PRT	82.2	PRT	63.3	IRL	61.1	PRT	46.3
17	PRT	9898	HUN	92.5	IRL	60.7	PRT	69.0	IRL	43.6
16	IRL	10904	IRL	78.5	HUN	76.5	HUN	86.1	HUN	61.9
15	ESP	12588	GRC	77.2	GRC	60.2	GRC	60.2	GRC	43.1
14	GRC	12975	ESP	81.6	ESP	63.0	ESP	67.4	ESP	45.9
13	HKG	13767	HKG	80.0	HKG	60.6	HKG	66.0	HKG	43.4
12	GBR	15668	ITA	79.6	ITA	59.8	NOR	55.9	ITA	42.7
11	ITA	16676	GBR	86.0	AUS	56.2	AUS	55.1	AUS	39.1
10	FIN	17019	AUS	74.9	GBR	67.4	ITA	65.4	GBR	50.9
9	FRA	17750	NOR	77.0	NOR	61.3	GBR	74.8	NOR	44.2
8	NLD	17754	NLD	83.1	NLD	64.8	NLD	69.7	NLD	47.9
7	BEL	17870	FIN	87.6	FRA	66.0	SWE	66.4	FRA	49.2
6	NOR	18408	FRA	84.2	FIN	69.3	FRA	71.4	SWE	46.7
5	AUS	18739	SWE	81.3	SWE	63.7	FIN	77.4	FIN	53.1
4	SWE	18787	BEL	89.6	BEL	72.7	USA	58.1	USA	43.1
3	DNK	20027	DNK	84.2	CAN	65.3	DNK	69.4	CAN	48.5
2	CAN	20779	CAN	84.5	DNK	67.9	BEL	80.8	BEL	57.1
1	USA	23352	USA	77.2	USA	60.3	CAN	70.3	DNK	51.4

Table 9: **Welfare measures (consistent sample), 1990**

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
42	MWI	679	MDG	48.4	MDG	37.5	MDG	24	MDG	23.1
41	MDG	987	MWI	75.5	MWI	57.5	MWI	51.9	MWI	40.3
40	NGA	1198	NGA	57.4	NGA	42.8	NGA	34.3	NGA	27.2
39	BGD	1399	BGD	85.1	BGD	66.4	BGD	73.8	BGD	49.7
38	IND	1833	IND	83.5	CIV	48.8	CIV	46.5	CIV	32.3
37	PAK	1912	CIV	65.9	PAK	61.5	PAK	66.9	PAK	44.4
36	CHN	1955	PAK	80.3	IND	65.1	CHN	65.6	IND	48.3
35	CIV	2324	CHN	81.2	CHN	63.9	PAN	23.9	CHN	46.9
34	LKA	2753	LKA	77.7	PHL	49.1	IND	72	PHL	32.5
33	IDN	3120	PHL	67.9	LKA	58.9	SLV	40.8	LKA	41.7
32	PHL	3294	SLV	62	SLV	46.2	PHL	49.9	SLV	30.1
31	SLV	3858	IDN	80.8	IDN	61.3	LKA	63.5	IDN	44.2
30	MRC	3886	PAN	50	MRC	55.5	JAM	41.9	PAN	25.3
29	JAM	4488	MRC	73.7	PAN	40.4	THA	37.6	JAM	32.7
28	THA	5290	JAM	64.6	JAM	49.3	IDN	67.6	MRC	38.4
27	CRI	5397	THA	60.1	THA	45.1	BRA	31.4	THA	29.1
26	COL	5401	COL	64.3	COL	48.1	MRC	57.3	BRA	24.6
25	TUN	5404	BRA	53.4	BRA	39.5	COL	43.2	COL	31.7
24	PAN	5460	CRI	68.9	CRI	52.4	CRI	47.4	CRI	35.5
23	TUR	6282	TUN	72.2	TUN	54.6	TUN	54.1	TUN	37.6
22	BRA	6805	TUR	68.8	TUR	50.7	MEX	36.7	TUR	33.9
21	MYS	7141	MEX	58.3	MEX	42.6	TUR	50.2	MEX	27
20	MEX	8027	MYS	70.1	MYS	52	MYS	51.8	MYS	35.1
19	HUN	10510	HUN	85.9	HUN	67.9	GRC	56.3	PRT	39.6
18	TWN	12018	GRC	75	PRT	56.7	HUN	74.3	HUN	51.4
17	GRC	13101	PRT	74.9	GRC	58.5	PRT	58.5	GRC	41.3
16	PRT	13470	TWN	85.6	TWN	67.9	TWN	73.9	TWN	51.4
15	IRL	15496	IRL	79.7	IRL	61.3	IRL	64	IRL	44.2
14	ESP	15845	ESP	84.2	ESP	65.7	ESP	71.8	ESP	48.9
13	GBR	20055	GBR	78	GBR	59.1	GBR	61.9	GBR	42
12	ITA	21133	HKG	75.6	HKG	56.6	HKG	58.9	HKG	39.4
11	NLD	21322	ITA	83.7	ITA	65.2	NOR	66.5	ITA	48.3
10	BEL	21756	AUS	82.5	AUS	64.2	ITA	71.1	AUS	47.2
9	FRA	21916	FRA	83	FRA	64.7	AUS	68.5	FRA	47.8
8	AUS	21960	NLD	85.5	NLD	66.8	FRA	69.4	NOR	46.9
7	FIN	22186	NOR	81.7	NOR	63.8	NLD	73.6	NLD	50.2
6	NOR	22378	BEL	89.3	CAN	62.3	USA	54.3	CAN	45.2
5	SWE	22751	FIN	88.1	FIN	69.8	BEL	80.3	USA	40.1
4	HKG	22796	SWE	88.1	BEL	72.2	FIN	78.7	FIN	53.7
3	DNK	23866	CAN	87.3	SWE	69.6	SWE	78.6	SWE	53.4
2	CAN	24462	DNK	89.6	USA	57.3	CAN	75.3	BEL	56.5
1	USA	28958	USA	74.3	DNK	72.4	DNK	80.7	DNK	56.7

Table 10: **Welfare measures (consistent sample), 2000**

Rank	GDP/cap (PWT-PPP)		Atkinson ($\epsilon = 1$)		Sen		Atkinson ($\epsilon = 2$)		Dagum	
42	NGA	774	NGA	60.7	NGA	44.5	NGA	40.4	NGA	28.6
41	MWI	858	MWI	62.3	MWI	45.4	MWI	43.6	MWI	29.4
40	MDG	915	MDG	63.7	MDG	47.3	MDG	44.3	MDG	31.0
39	BGD	1843	CIV	67.8	CIV	50.3	CIV	49.6	CIV	33.6
38	CIV	2046	BGD	81.7	BGD	63.0	LKA	33.8	BGD	46.0
37	PAK	2197	PAK	82.7	PAK	63.7	BGD	69.7	LKA	24.2
36	IND	2713	LKA	55.4	LKA	39.0	JAM	37.2	PAK	46.7
35	LKA	3612	IND	77.4	IND	58.7	PAK	71.5	IND	41.5
34	PHL	3749	JAM	60.7	PHL	46.7	SLV	33.2	PHL	30.5
33	IDN	3987	PHL	66.8	JAM	46.0	IND	63.1	JAM	29.9
32	JAM	4042	SLV	57.8	SLV	45.0	PHL	48.3	SLV	29.0
31	MRC	4068	MRC	73.4	MRC	55.3	PAN	29.7	MRC	38.2
30	CHN	4101	IDN	79.4	IDN	60.6	COL	34.2	COL	27.1
29	SLV	4854	CHN	77.4	CHN	59.3	THA	30.4	PAN	25.8
28	COL	5892	COL	57.2	COL	42.6	MRC	56.9	CHN	42.1
27	CRI	6425	PAN	53.3	PAN	41.0	CHN	60.8	IDN	43.5
26	PAN	6640	THA	54.4	BRA	38.8	BRA	32.5	BRA	24.1
25	TUN	7417	BRA	53.7	THA	41.5	IDN	66.5	THA	26.2
24	TUR	7478	CRI	66.9	CRI	49.9	CRI	46.2	CRI	33.2
23	THA	7505	TUN	71.9	MEX	41.8	MEX	36.9	MEX	26.4
22	BRA	7870	TUR	72.7	TUN	54.1	TUN	54.3	TUN	37.1
21	MEX	9590	MEX	57.9	TUR	54.9	TUR	55.3	TUR	37.8
20	MYS	10857	MYS	68.0	MYS	50.0	MYS	48.9	MYS	33.3
19	HUN	11426	HUN	85.8	HUN	67.3	HUN	74.6	HUN	50.7
18	GRC	15995	GRC	78.6	GRC	60.3	GRC	61.3	GRC	43.2
17	PRT	17428	PRT	76.8	PRT	57.9	PRT	59.7	PRT	40.8
16	TWN	18668	ESP	80.3	ESP	61.1	ESP	65.6	ESP	44.0
15	ESP	19753	TWN	85.5	TWN	67.6	AUS	48.3	HKG	32.1
14	ITA	23839	GBR	77.4	GBR	58.0	TWN	74.4	TWN	51.1
13	GBR	24287	ITA	79.9	HKG	48.6	HKG	48.7	AUS	34.8
12	FRA	24471	AUS	69.9	AUS	51.6	GBR	61.4	GBR	40.9
11	SWE	25869	HKG	67.4	ITA	61.6	ITA	64.1	ITA	44.5
10	BEL	26029	FRA	82.7	FRA	64.4	FRA	69.8	DNK	39.9
9	FIN	26041	SWE	83.3	SWE	63.4	DNK	59.7	FRA	47.5
8	NLD	26611	BEL	84.4	DNK	57.0	SWE	71.5	SWE	46.5
7	AUS	27975	DNK	77.1	BEL	65.2	BEL	73.2	BEL	48.3
6	IRL	28874	FIN	88.3	NLD	67.1	NOR	64.7	NOR	43.7
5	DNK	29123	NLD	87.1	NOR	60.8	IRL	66.5	IRL	45.5
4	HKG	29222	IRL	81.3	IRL	62.5	NLD	76.5	NLD	50.5
3	CAN	29447	NOR	79.8	FIN	70.4	FIN	78.9	FIN	54.3
2	NOR	29618	CAN	83.3	CAN	65.0	CAN	69.9	CAN	48.1
1	USA	36440	USA	75.8	USA	58.0	USA	57.7	USA	40.8

Table 11: **Sensitivity Analysis**

Year	Country	Adjusted Gini	Alternative Gini	Alternative adjusted Gini	Changes in ranking*			
					A1	Sen	A2	Dagum
1970	Bangladesh	36.9	28.5	28.5	-	-	-	-1
	Brazil	61.1	57.1	57.6	-1	-	-2	-1
	Colombia	57.3	50.4	51.5	-2	-1	-7	-4
	Denmark	34.3	27.8	30.4	-	-	-	-
	Finland	37.1	26.7	34.1	-	-	-	-1
	Indonesia	43.3	34.1	40.5	-1	-1	-1	-2
	Ireland	40.1	30.4	33.0	-	-	-2	-2
	Pakistan	33.4	29.7	36.1	-	+1	+1	+1
	Philippines	49.1	39.9	39.9	-2	-3	-4	-6
	Spain	38.9	32.1	39.4	-	-	-	-
1980	Finland	30.6	20.5	27.8	-1	-1	-1	-
	Jamaica	48.3	58.2	58.2	+2	+2	+2	+2
	Madagascar	52.0	46.3	46.3	-1	-	-1	-1
	Portugal	36.7	40.2	45.5	-	-	+1	-
	Thailand	48.3	42.6	47.9	-	-	-1	-1
	Turkey	49.1	43.3	48.6	-	-	-1	-
	Spain	37.0	26.9	32.2	-	-1	-1	-1
1990	Bangladesh	33.6	26.6	31.9	-	-	-	-
	Cote d'Ivoire	51.2	36.9	42.2	-2	-3	-4	-3
	Finland	30.1	20.1	27.4	-	-2	-1	-2
	Indonesia	38.7	31.9	37.2	-	-	+1	-1
	Italy	34.8	29.8	37.1	-	-	+1	-
	Jamaica	50.7	44.5	49.8	-	-	-2	-1
	Madagascar	62.5	48.5	53.8	-1	-1	-2	-1
	Malaysia	48.0	49.1	49.1	-	-	-	-
	Norway	36.2	25.2	32.5	-	-	-5	-2
	Philippines	50.9	44.4	49.7	-	-	-	-
	Portugal	43.3	31.0	38.3	-1	-2	-	-2
	Sri Lanka	41.1	32.4	37.7	-	-	-	-1
	Spain	34.3	29.3	36.6	-	-	-	-
	Thailand	54.9	43.6	43.6	-4	-4	-8	-4

continued on next page

Table 11: *continued*

Year	Country	Adjusted Gini	Alternative Gini	Alternative adjusted Gini	Changes in ranking*			
					A1	Sen	A2	Dagum
2000	Belgium	34.8	29.6	36.9	+1	+2	+2	+2
	Denmark	43.0	35.0	41.4	-1	-1	-1	-3
	Finland	29.6	23.7	31.1	+1	+2	+2	+1
	Italy	38.4	29.8	37.1	+1	-	+1	-
	Jamaica	54.0	43.3	48.6	-	+1	-5	+1
	Mexico	58.2	53.5	56.1	-	-2	-	-
	Norway	39.2	28.8	36.1	-1	-2	-4	-3
	Spain	38.8	32.6	37.9	-1	-	-	-
	Sri Lanka	61.0	27.6	32.9	-5	-6	-12	-10
	Taiwan	32.4	32.0	33.2	+1	-	+1	+1
	Thailand	58.5	44.6	49.9	-2	-1	-5	-1
	United Kingdom	41.9	31.5	38.8	-2	-2	-1	-

*: A negative sign corresponds to a lower (i.e. better) rank, a positive one indicates a worsening in ranking.

Table 12: **Rank changes over time II: Inequality-adjusted welfare measures compared to GDP per capita**

	No change	**1-2 Rank changes**	**3+ Rank changes**
1970			
A1	17	17	8
Sen	11	20	11
A2	9	18	15
Dagum	9	16	17
1980			
A1	13	25	4
Sen	12	26	4
A2	8	25	9
Dagum	8	26	8
1990			
A1	13	22	7
Sen	8	23	11
A2	8	16	18
Dagum	10	18	14
2000			
A1	12	16	14
Sen	11	17	14
A2	7	12	23
Dagum	10	13	19

Notes: Analysis is based on using a consistent sample of 42 countries and original (unadjusted) Gini coefficients and quintile shares.

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