

## World inequality and globalization

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### **PLEASE NOTE: THE TABLES APPEAR AT THE END OF THIS DOCUMENT.**

The question of world inequality is an increasingly and its relationship with globalization are hot topics of debate among academics, international organizations, NGOs and political activists. If there is a pattern to the academic side debate over recent decades it is something like this: until quite recently most academic studies (of a relatively small total number) concluded that world inequality was and is growing; then some more recent studies, using different methods and newly available data, began to suggest that the level of inequality in income is less than previously believed and has, since 1980 at least, been declining, a conclusion vigorously contested by others; finally, others have proposed broader measures of welfare and development which suggest that the decline in inequality may have been continuing for a long time. This article aims to examine the reasons why different methods and data produce different conclusions about inequality, to evaluate which methods better approximate the truth and finally to assess briefly what it all has to do with globalization. The debates are significant because they encompass positions which imply fundamentally different conceptions of the world, of where it is going and of how to change it.

### ***1. Three approaches***

There are, broadly, three approaches to measuring world inequality, and within each of the three several variations. The first approach looks at the distribution of income alone in various ways. The most straightforward one is to analyse the convergence or divergence of countries; each country is considered as if it were one person (what one might call the UN General Assembly method of one country one vote). Convergence or divergence are assessed by calculating the changes over time in some measure of dispersion (for example, the coefficient of variation or the Gini coefficient) or by regressing changes on initial values.

Data on income per head and population can be used to calculate the evolution of average income differences between large groupings of countries (for example, North and South, or whole continents) and to produce an integral measure of inequality (for example, the Gini coefficient weighted this time by population, as is more normal). This method (referred to in this article as *inter-country* distribution) treats all members of the population of a country as if they have the same income; it is, so to say the method of the block vote (each person counts but the inhabitants of each country are all assumed to vote the same way).

A further variant also aims to find an overall measure of inequality but it takes into account intra-country as well as inter-country distribution, in effect considering the whole world as if it were one country (referred to in this article as *global* distribution). Most studies of this kind start from national income per head figures and decompose them by separately-arrived-at estimates of income distribution. One, however, has started from household surveys and built up the income and the distribution figures in the same act; in this way the separate national income per head figures and distribution estimates are not required since they emerge from the household income data (Milanovic 2002). Ideally these global measures would be made in the knowledge of the income of all the world's households over the same period. In fact, of course, the data is always available by groups, usually quintiles, which for populous countries means that a huge number of people are still assumed to have the same income (a quintile of the Chinese population is equivalent to the whole population of the USA, the world's third largest country). Virtually all studies suffer from this limitation of data points. And, in addition, in many countries such studies of distribution as exist are not done at regular intervals. Their methods may change between studies and may differ between countries.

A second approach is to measure the world distribution of a more complex indicator of welfare than income. In theory this could mean the addition of an almost limitless number of extra indicators and there have been many suggestions in the literature (see for instance, Adelman and Morris 1967). But in practice it means above all else the addition of life expectancy to income and, in the special case of the Human Development Index (HDI), of an education indicator as well.

A third approach uses the same income indicators as the first but measures distribution not by generating a single integral statistic of divergence or inequality, but by looking at ratios between the incomes of defined groups, usually percentages, of the population with specified relative income levels: for instance, the ratio of the income of the highest twenty per cent to that of the lowest twenty per cent, or the ratio of incomes at given percentiles of the distribution (e.g. the 90<sup>th</sup> to the 10<sup>th</sup>). Any similar ratio can be used, from the "Robin Hood ratio" (top 50 per cent to bottom 50 per cent) to the ratio between the top and bottom one per cent or even less of the population. In these measures of inequality the intervening figures do not enter into the conclusion (except in the special case of the 50/50 formula which of course includes all values).

This article will, in sections 3 to 8 summarize and compare the results obtained from these different approaches before summing up the results in section 9 and discussing their relation to globalization in section 10. But before that it discusses some salient issues about data alternatives which tend to crop up in each of the approaches and their variations.

## ***2. Data alternatives***

Any attempt to measure world inequality must confront a large number of choices: between possible variables to be used to represent welfare, between different ways of measuring the variable/s, between different ways of converting them to a common criterion, between different measures of divergence, variance or inequality. Some of these choices have to be made regardless of which of the three overall methods is being used to measure divergence or convergence.

a. *How to compare incomes (exchange rates versus purchasing power parity)*

During the last few decades the increasing availability of PPP estimates of GDP and national income has made their use practical in international comparisons. Their theoretical advantage is that they compare real income levels removing the long and short term reasons why exchange rates do not equalize purchasing power. Just as the invention of inflation adjustment enabled us to make truer comparisons over time so the invention of ppp estimation enables us to make truer comparisons between countries at any particular time. In principle a ppp dataset consisting of values for many countries and many dates produces figures which are comparable both vertically and horizontally; it is tempting to see it as the economic equivalent of the human genome.

But why not use the more available exchange rate data? Until ppp estimates began to be produced in sufficient quantities all estimates of international inequality were carried out using exchange rate data. Ppp estimates produced an apparently lower level of inequality since the market or administered exchange rates of poor countries tend to be far below the exchange rates which would equalize purchasing power. And after 1980 nearly all ppp estimates produced a declining trend in inequality which the exchange rate figures did not. This, of course, tempted many to insist on using the exchange rate figures which suggest a more unequal world. Why is it wrong to do that, as I believe it to be? I propose three reasons:

GDP is a measure of the value of production. And ppp attempts to measure this value at a common set of prices. Rough and ready though it is a better measure of output available for consumption than an exchange rate measure which in effect implies that all national output was sold on world markets and all national consumption was imported.

The differences between ppp and exchange rate calculations of national income are so great that the one which is chosen changes not only conclusions about the level and trend of inequality but also many other important conclusions about the world. For instance, it is often said that Japan is the second largest economy in the world, followed by Germany. That is true using exchange rate comparisons. But on the basis of ppp it is China which is the second largest, far larger than Japan. And what is more, on present trends (projecting relative growth rates since 1980) it will be the largest economy only 4 years from the publication of this issue of *Oxford Review of Economic Policy*. Also, according to exchange rate comparisons, US military spending is over 10 times that of China; but according to ppp estimates it is only twice as large and the Chinese figure is growing faster (SIPRI 2003). If we are to understand the strategic movement of power in the world, in particular the economic basis of US power, then the choice of measure we make will be very important. Exchange rate estimates may very well exaggerate the scale of US power. In addition the predictions of global warming are made on the basis of exchange rate comparisons. The International Panel on Climate Change has recently been accused of exaggerating the prospects for global warming by assuming that the developing countries will catch up and overtake the developed ones in income levels during the 20<sup>th</sup> century. A much greater amount of economic growth (and so increase in carbon emissions) is estimated if catching up starts from exchange rate levels of income rather than from ppp levels of income (Castles and Henderson 2003). These are not issues which have simple solutions. The general point is that the choice between exchange rate and ppp estimates of national income is one between different views of the world in many respects, economic, strategic and environmental.

Yet there are problems. Just as inflation adjustment over long periods cannot be perfect because of changing product mixes, ppp estimates encounter spatially equivalent difficulties in comparing countries with very different consumption patterns. But if a spatial equivalent of the time series chain index is used some of this problem can be at least partially overcome. Less fundamental, but perhaps more serious in practice, is the fact that ppp estimates require an immense amount of work to produce while exchange rate estimates are immediately available from routinely published figures. If the apparatus which now produces ppp estimates were to collapse then the method would be lost. Since there are a lot of problems to solve in producing ppp estimates they are unlikely to be consistent over time or between different estimates. This last problem is illustrated by major differences between three available sources of ppp income data (the Penn World Table, Angus Maddison and the World Bank) (Sutcliffe 2003). It seems safest to do calculations using all three where possible, laborious as this may be. There are significant differences in the conclusions although they are smaller than the differences between any of the ppp estimates and exchange rate figures. Preference has been shown, however, for Maddison's figures on the grounds that, at the time of writing, they are the most recently updated and they are historically the most complete.

The choice of ppp figures, however, does not mean in any way that the problems are over. These estimates are still extremely problematic. As already mentioned, there are three available series of ppp income data: the Penn World Table 6.1, presenting figures in 1996 prices, starts in 1950 but many items are missing in the early years and so comparisons starting in 1950 involve restricting the number of countries. The World Bank publishes in World Development Indicators ppp estimates of GDP and GNI per head starting in 1975. But they are only available in current prices which means that cross section comparisons are possible but time series are not. The Maddison data set is by far the most ample and has recently been revised and updated and made available in digital form (Maddison 2003). His annual data starts from 1870 but many countries are missing up to 1950. After that date, where no figure is available an estimate is made, sometimes for groups of countries together. So after 1950 there are no blanks in the data. There is, as in all estimates a discontinuity in or after 1990 due to the separation of the USSR, Czechoslovakia and Yugoslavia into separate countries.

The methodology of the three data sets has common roots in the International Comparisons Project, but each one deviates to some extent from the others. The inter-estimate inconsistency country by country is rather high (see Sutcliffe 2003). To give an example, the ratio in 2001 US GDP per head was 9.1 times that of China; PWT 6.1 shows it as 8.9 times as high and Maddison as 8.2 times as high. Such relatively small differences can make considerable differences to results, especially when they are between countries whose weight in the overall distribution is so great. Nevertheless, for recent years (roughly 1996–2000 all three available ppp sets lead to remarkably similar aggregate results for the inter-country Gini coefficient (see Figure 1).

#### *b. Weighted or unweighted figures*

Comparisons unweighted by population mean treating all the countries in the sample as one unit; Nicaragua and China are equivalent. While this may seem like madness there is sometimes some method in it; it may be that we are most interested in the convergence or

divergence of countries rather than people. This could be the case for instance if we were interested in the relative effects of different government policies, whose effects are considered to be restricted to one country. If, however, we are seeking an overall view of world distribution population weighting is imperative. But the fact that many people live in countries which have grown relatively fast should not be allowed to cancel out the fate of those who live in countries which have grown slowly or declined. Comparing country averages may be a way of drawing attention to the losers.

### *c. Inter-country or global*

Studies of international convergence, divergence and inequality can be inter-country, involving comparing the average income of the countries in the sample, or global which means also making an allowance for intra-country distribution. In the first case our variables would be the average income of the whole country (i.e. income per head) in the second it would be the average income of a group in the population (deciles, quintiles and even households) plus the size of the population in each group. Estimates of inter-country inequality require only data on GDP and population which are plentiful if not always consistent. Global distribution also requires internal distribution figures which are both scarce and much less reliable and consistent than income data. Applying the most demanding standards to this data would make global studies more or less impossible (Atkinson and Bardolini 2001). They are, however, carried out using the Deininger-Squire database (incorporated into the WIDER Income Inequality Database) and/or estimates from older and more diverse sources (Bourguignon and Morrison 2002; Milanovic 2002). It is also possible to fill in gaps in distribution figures by calculating trends from known data points although this seems like a very risky procedure if the data points themselves are not considered reliable (Sala-i-Martin 2002a). The growth in the number of household sample surveys based on a common methodology may make it easier to study global distribution in the future.

### *d. Poverty or distribution*

This article is mainly concerned with the estimate of distribution not of poverty or riches. It needs to be mentioned, however, that they are alternative ways of looking at least at part of the problem. In present world discourses on this topic there is at the political level an overwhelming concentration on poverty rather than distribution. The conventional wisdom considers that absolute poverty, however it is defined and measured, is pathological and should be eliminated. High income, however, is not generally regarded as pathological, except as part of an environmentalist approach to economic growth. Nor is inequality conventionally regarded as undesirable in itself. The answer put forward to poverty is “pro-poor growth” or some variant of it, which might coincidentally affect distribution, but not deliberate redistribution. To advocate redistribution in today’s world is, in the opinion of many prominent economists, to speak out of turn (Feldstein 1999).

## **3. Inter-country distribution**

### *a. Convergence and divergence of country averages*

The simplest way to measure the trend of world inequality is to look at the income or product per head of different countries and see whether they are converging or diverging (calculating some measure of dispersion at two or more dates by regressing changes over a given period on initial values). Such calculations, of which there have been many, almost

invariably give one of two results: either there is no significant trend or there is a significant divergence. There is no significant relationship between the growth of income from 1950 or 1960 to 2000 and the starting figure. Table 1 shows the evolution of the coefficient of variation of a number of variables used to measure inequality.

**Table 1: Comparative measures of welfare between countries, 1960–2000**

The calculations reported in Table 1 show various ways of seeing inter-country divergence and convergence. Row 1 contains the crudest measure of all – the ratio of the average income of the 10 richest and 10 poorest countries out of the 145 countries and groups of countries (rising to 163 after 1990 due to the break-up of the USSR, Yugoslavia and Czechoslovakia) listed in the latest version of Angus Maddison's historical estimates (Maddison 2003). This simple crude measure shows slow convergence from 1950 to 1985 and rapid divergence thereafter. This pattern also seems to be repeated in some of the other statistics in Table 1. The coefficient of variation (standard deviation divided by mean – a rise in which indicates greater variation around the mean) of income/GDP per head, according to both Maddison's and the World Bank's figures, also shows divergence between 1990 and 2000 after showing convergence before. PWT 6.1 figures (not shown here) give a similar result. The same pattern is seen in the unweighted Gini coefficient of income per head (row 5) and in the coefficient of life expectancy at birth (row 6). The only exception to the pattern in Table 1 is the coefficient of variation of country income per head using exchange rate comparison. This statistic shows divergence between 1980 and 1990 and convergence between 1990 and 2000, a result which may give food for thought to those who prefer to use exchange rate figures because they believe them to be a truer representation of actual inequality.

In addition to Table 1, calculation of regressions of changes in per capita national income of GDP between 1950 (or 1960) and 2000 against initial levels show no significant relationship. The correlation coefficient between these two variables (using both Maddison's and PWT's figures) is zero. Hence no more details are presented here.

There is little or no evidence here for persistent convergence between countries. One response to this has been to say that the conclusion is erroneous because the method treats all countries equally rather than weighting country values by population. In an overall judgement 1,250 million Chinese citizens, whose average income has risen by 450 per cent during the 40 years should count for more than 5 million Nicaraguans whose average income has fallen by 39 per cent during the same period. This is the argument of Stanley Fischer (recently Deputy Director of the IMF) in his 2002 Richard T. Ely lecture to the AEA. He presents it in the form of two parallel graphs showing the relationship between the growth of income per head between 1980 and 2000 and the original 1980 figure. The first, where each country appears as an equal-sized dot shows the familiar pattern of no discernable relationship between the variables, while the second show countries as balloons whose sizes depend on their population. China and India dominate the second diagram; they are both countries which very large populations which had incomes near the bottom of the scale in 1980 but very high growth rates in the subsequent 20 years. The conversion of this second picture into an appropriate statistical measure is bound to show some kind of convergence and Sala-i-Martin has produced such a result (Sala-i-Martin 2002a). But the fact remains that, whichever picture we look upon, some countries have gained and others have lost. And neither kind of country is simply one odd exception to a general rule. As a result population weighting may be as misleading in a different way as not weighting. The conclusion that, taking population into

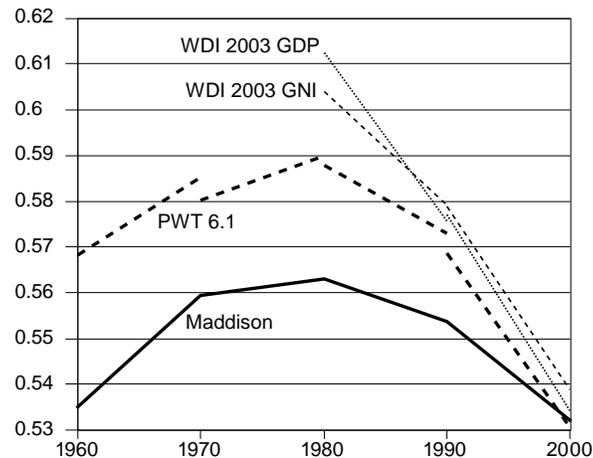
account, there has been convergence between, say, 1980 and 2001 may hide but does not alter the fact that in that period in the poorest continent (Subsaharan Africa) 20 countries (of 38 with data) experienced a fall in national income per head and 20 (of 42) experienced a fall in life expectancy (World Bank 2003).

*b. Population-weighted convergence and divergence*

In theory the question of population weighting also comes when in calculating an integral measure of inequality, such as the Gini coefficient. To give an example of the difference it can make: the Gini coefficient for the world (in fact the only 50 countries for which full data exists) during the period 1900 to 1950 (using Maddison figures, the only ones available for this period) rose from 0.3426 to 0.3840 if we treat each country on the UN General Assembly basis; but if we weight countries by their populations the Gini coefficient is higher at both dates and also rises proportionately more (from 0.4496 to 0.5573); in other words inequality considerably worsens. (Author's calculation from Maddison 95, 39 countries, none African, 82 percent of world population in 1900). An integral measure of distribution (as opposed to convergence and divergence) makes almost no sense at all if the countries are not weighted and in practice it is never calculated in that way. The example, however, is merely to show that population weighting does not always reduce but may also increase inequality.

When trends are compared, however, there is much less similarity. Up to 1960 Maddison's data are the only ones available. They show a long term and very substantial increase in world inter-country inequality from 1820 to 1980. In that year inequality begins to fall. After 1960 Maddison's figures can be compared for the period from 1960 with PWT 6.1 and from 1980 a three-way comparison is possible including the WDI figures. These (decadal) comparisons are shown in Figure 1. The PWT and WDI series have steps because for each decade a maximum number of countries with figures at both ends of the decade have been chosen. That means some discontinuity since in each decade compared there is a different (growing) number of countries. The Maddison figures show only one small discontinuity in 1990 due to the change to independent estimates for the component countries of the USSR, Czechoslovakia and Yugoslavia in that year; otherwise there are no blank spaces in his data.

Figure 1: Four ppp estimates of the inter-country Gini coefficient, 1960 – 2000

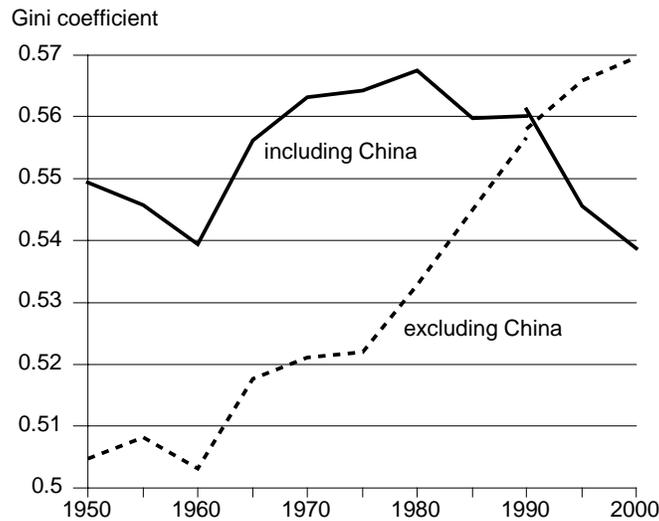


Sources: Maddison 2003, Summers, Heston and Aten 2003, World Bank 2003

All three ppp data sets, as far as direction of movement is concerned, are consistent with an inverted U which rises up to 1980 and falls in the two subsequent decades. Since 1980 according to this measure inter-country distribution of income has been growing less unequal. But the degrees of change between the three sets are noticeably different. The WDI figures show the largest fall and Maddison the smallest.

Using Maddison's latest estimates it is possible to construct a continuous series for the inter-country Gini coefficient including all countries of the world from 1950, and this is shown in Figure 2. It falls (greater equality) from 1950 to 1960, probably due to the postwar catching up of Europe and Japan with the USA. It then rises strongly until 1980, due to many factors but mostly the rapid growth of the developed countries and the disappointing growth of the South, especially South and most of East Asia and Africa. It then falls again up to 2000. This again has many causes but one probably the most important one is shown by removing China from the figures. Inequality in that case rises continuously and fast from 1960 to 2000. The interpretation that all the apparent drop in inequality after 1980 was due to China is too simplistic since China and other parts of the world interact. So the figures for China may be excluded but the influences of China, both for and against equality remain. What the removal of China does do is to emphasize the enormous importance of developments in this one huge country to the interpretation of the world, not only in respect of income distribution. It also suggests that in combining inter-country with intra-country distribution to produce an estimate of global distribution, the influence of the evolution of the internal distribution of income in China (and indeed in India) will assume enormous weight.

Figure 2: **Inter-country Gini coefficient, including and excluding China**



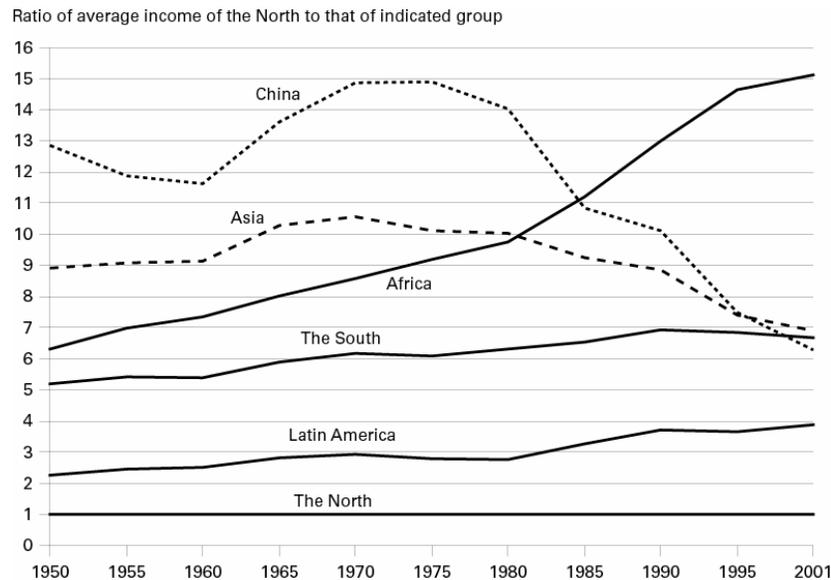
Source: Maddison 2003

*c. Converging and diverging blocs*

There is a considerable amount of literature hypothesising that convergence may not be between all countries but between blocs (or convergence clubs as they are often called). The two bloc convergences which have most been commented on are the developed countries (the North America, Australia, New Zealand, Japan and Western Europe) and the very poorest group of countries. It is not part of my purpose in this article to enter into this debate; but it is worth indicating the conclusions suggested by the latest version of Maddison's figures. These are summarized in Table 2. The population weighted Gini coefficients shown there indicated a strong convergence process among the developed countries during the years 1950 to 1970. After that, however, the inter-country in this group remains almost stationary. In the case of the developing countries (the South) a generally divergent trend from 1955 to 1980 is followed by a convergent one thereafter. In Africa intra-continental inequality grows steadily throughout the period; in Latin America the Gini coefficient falls up to 1990 and then rises in the final decade; and in Asia a strongly divergent trend up to 1980 is followed by a weak and slightly erratic convergent one. At this level of aggregation the only convergence club to appear is the developed countries of the North but only between 1950 and 1975, a period comprising the post-war recovery and the 1960s boom and perhaps Latin America during the 1960s and 1970s.

Table 2 also shows (as does Figure 3) the ratio of the average of income of the developed countries compared to the countries of the North. Here the patterns are much clearer. After 1990 the averages of both China and Asia as a whole show convergence with that of the North; the South as a whole shows gradual divergence throughout the period; for Latin America that divergence is marked and for Africa it is precipitous. The average income of the North was 6 times the African average in 1950 and rose continuously to reach over 15 times in 2001.

Figure 3: **Continental drift: ratios of average income of the North to different groupings of countries**



Source: author's calculations based on Maddison 2003

Two fundamental limitations of these inter-country estimates of world distribution call into question their ability to give any knowledge of the global distribution of welfare between households. The first is that they do not take into account internal distribution. It is obviously possible to imagine changes in the distribution of income within countries which would change very considerably, even negate, the movements indicated by inter-country calculations. The second problem is that they assume, if not that all national income is equivalent to welfare, then that the proportion of different countries' national incomes which contribute to welfare are equal across countries and that they do not change. While we want to compare household welfare national incomes contain different combinations of investment and of state spending not related to household welfare. Efforts to tackle the first of these problems have usually employed studies or estimates of inter-household distribution (made independently of national income estimates) and imputed the distribution of income among different groups (usually quintiles) of national populations. This leads to estimates of combined inter- and intra-country distribution, referred to here as global distribution.

#### 4. Global distribution

##### a. long-term

Bourguignon and Morrison's study (Bourguignon and Morrison 2002) is the only one to attempt to trace the long term history of global distribution. They base their calculation on Maddison's GDP figures from 1820 (Maddison 1995), using a wide range of sources as well as some estimation to adjust these for distribution. They describe their method both in their article and in greater detail in a site available on the internet (www.????). They conclude that global, like inter-country inequality increases more or less continuously from 1820 onwards, but that the inter-country component increases faster than the intra-country component. At the

start of the period when countries were at much more similar levels than today the inter-country Gini coefficient was 0.16 but at the same time the global Gini coefficient was nearer to 0.5. By 1960 the inter-country Gini had reached 0.535 (see section 3 of this article) while the global Gini was 0.635 (Bourguignon and Morrison 2002).

*b. recent trends*

Continuing with the story as Bourguignon and Morrison tell it, the Gini coefficient continued to rise from ) 0.635 in 1960 to 0.657 in 1980 and remained stable until 1992 (where they end the story as Maddison did in his 1995 book). So the trend is rising inequality from 1820 to 1980 and then stabilization; and during this period the contribution of intra-country inequality falls and that of inter-country distribution rises.

**Table 4: Global Gini coefficients 1960–2000**

For the same more recent period as that examined in section 3 a number of studies attempt, as Bourguignon and Morrison have done, to combine national income figures with internal distribution figures to produce an estimate of the movement of global distribution. The results of three of these are given in Table 5. There are differences between between these three studies regarding the source of income data (shown in in parenthesis in the table) and in the way they introduce distribution. Bourguignon and Morrison and Sutcliffe estimate for benchmark years only. The former use various sources of distribution data; the latter uses the Deininger-Squire dataset. Sala-i-Martin make annual estimates of distribution using Deininger-Squire and fitting trend lines. Despite these differences the methods produce global Gini values which are very close for years where they all have figures. And they show either a stabilization or a reversal of the earlier rising trend from 1980 onwards.

Other recent estimates using some combination of the same sources of data and measures of inequality other than the Gini coefficient (e.g. Firebaugh 2003) also arrive at broadly similar conclusions. It has to be concluded that all approaches which use ppp income data and then weight them in some way by available internal distribution figures show, as all ppp estimates of inter-country distribution, a decline in inequality since 1980 as measured by one integral measure, be it the Gini or some other coefficient. That has been demonstrated now a sufficient number of times. That conclusion seems to be in the data. And there is little chance that the conclusion will be reversed using the same methodology.

That, of course, does not mean that it is the correct conclusion; other methodologies and data may give different answers. For one thing, these global distribution estimates retain one of the main sources of error of the inter-country estimates, namely, the fact that not all of national income reaches households which can use them to finance welfare-related benefits. The only way to reach a different conclusion is to question the validity of the data, to use a different methodology (see Section 5), to measure with a different statistical measure (see Section 6) or to use a different variable or combination of variables to measure income or welfare (see Sections 7 and 8).

***5. Another method: “true distribution” through direct use of household surveys***

Branko Milanovic’s “true distribution” (Milanovic 2002), which has placed a cat among the pigeons by producing results apparently inconsistent with other recent studies, is a variant of global distribution and its comparisons are made using ppp conversions. But, since it uses

household surveys as raw material, it does not need to go through the stage of imputing the income of groups by weighting the national income estimate by the group shares. The previously described global distribution method of income imputing implicitly allocates the difference between total household income and total GDP pro rata, i.e. investment and state spending are assumed to be distributed in the same way as household consumption. Milanovic's method completely eliminates this problem. But it then leaves another one: relative welfare is clearly not restricted to household consumption since it also at a minimum includes the amounts received by each group of social spending on free services which contribute to welfare but which do not figure directly in household expenditure (education, health and a share of infrastructure). Milanovic discusses this problem but is not able to solve it.

If we are interested in the global distribution of welfare than in principle Milanovic's method is surely the most accurate. Its problem is that it rests on the comparability of the household studies which he uses. The problem of data and the infrequency of ppp benchmark studies means that he produces estimates of inequality for two years, 1988 and 1993. First, as he mentions, it is striking that his estimates of the global Gini coefficient for these years is 0.63 and 0.66, respectively. This is extremely close to those produced by the methods examined in Section 6. His principal conclusion is, quite rightly, that this shows the world has a level of inequality scarcely encountered in national economies. His second conclusion, however, differs from that of other studies. Between two dates, lying within the period in which other studies find a falling level of inequality, Milanovic's Gini estimate rises. It remains to be seen if over a longer period this method will reproduce this difference. In any case the existing difference needs to be explained. It would appear, from Milanovic's discussion of this, that the reason is not the fact that he does not use GDP per capita figures (since a similar result appears when he does so as a control) but that his distribution data permit a more detailed breakdown of internal inequality than the mixture of quintile data used by other global inequality studies – in particular for China and India. rising inequality between urban and rural incomes in these two giant countries has the major effect on the difference between his results and those of other studies. This, however, should be expected to increase the level of inequality. Yet his figure for the Gini coefficient in the first year, 1988, is actually slightly lower than that produced by other global calculations (although they are all very close), while only the second year shows a higher Gini. In that case the difference seems to be largely due to the fact that his method catches the sharp growth in urban–rural inequality in China and India while those which use overall national figures do not. It is strongly to be hoped that Milanovic's method can be applied to a longer time period since in principle it seems likely to give a more convincing picture of global inter-personal distribution, although it requires an enormous data collection and homogenization process.

### ***6. Using a different statistic: ratios of extremes***

An integral measure of inequality is not necessarily a good estimator of social justice. What is received by the most and least economically privileged part of a population can be a much better indicator, even though it does not use all of the data available on distribution among the population. It is quite possible for a Gini coefficient to improve even though the ratio of incomes at the extremes worsens. At least, therefore, we need to look at indicators of inequality other than the integral measures.

The effects of doing so produce a rather different picture of recent developments from that produced by the earlier estimates of the Gini coefficient. Table 5 is based on the same data as

Figure 2: it refers to inter-country not global calculations based on Maddison 2003. It shows the ratio of the income per head of the individual at the 80<sup>th</sup> (90<sup>th</sup>) percentile of the distribution to that of the individual at the 20<sup>th</sup> (10<sup>th</sup>) percentile. The 80/20 ratio falls in the first five years, rises to a peak in 1970 and then falls again until 2000. By contrast the more extreme falls up to 1960 and then rises continuously up to 2000. While the gap between

The first two sections of Table 6 show estimates of global inequality based respectively on the WDI and the Maddison 2001 ppp income figures (Sutcliffe 2003). Between 1980 and 2000 (1998 in the case of Maddison) we observe the already familiar falling Gini coefficient. In this table the ratios of extremes are not ratios of incomes per head at given percentile points in the distribution but they refer to the ratios of the total incomes above and below the indicated position in the distribution. In both estimates the 50/50 and 20/20 per cent ratios also fall as does the 10/10 per cent ratio using WDI figures. But the 10/10 per cent ratio using Maddison and the 5/5 per cent ratio with both sources falls and then rises again from 1990 to 2000. Most dramatically the ratio of the richest to poorest 1 per cent rises continuously using both datasets. This result is consistent with that arrived at by Melchior for inter-country estimates. It mirrors trends withing a number of developed countries, especially the USA (Krugman 2002, Smeeding 2002).

**Table 5: Inter-country ratios of extremes 1950–2000**

**Table 6: Global ratios of extremes, 1980–2001**

The last part of Table 6 shows the figures for the ratio of extremes in the year 2001. These figures are not strictly comparable to the others. The calculations for 2001 are a one-off exercise based on the 125 countries for which the World Bank now publishes both ppp GDP per head figures for 2001 and a recent estimate of income distribution divided between the top and bottom two deciles and quintiles 2, 3 and 4. This is a much larger number of countries than in previous years and the countries considered contained 92.5 per cent of world population. Because of lack of earlier distribution estimates for many countries they cannot be exactly compared with earlier figures but they portray the most recent and complete picture of global distribution available using this method. The groups which, according to this method, emerge as the richest 1 per cent of the world's population are the richest 10 per cent of the following countries: USA, Hong Kong, Switzerland, Singapore, Ireland, Germany, Netherlands, Italy, UK, Norway, Canada, Australia and Denmark; and the poorest 1 per cent are composed of the poorest 40 percent in Sierra Leone, the poorest 20 per cent in Ethiopia, Niger, Zambia, Central African Republic, Malawi, Nigeria and Tanzania and the poorest 10 per cent in Burundi, Mali, Lesotho, Guinea-Bissau, Burkina Faso, Madagascar and Honduras. Of course, more detailed intra-country distribution figures would admit people from other countries to these extreme groups. While this estimate for 2001 is not strictly comparable to those for earlier years their trend makes it quite clear that, if our criterion is the ratio of incomes of the very top and very bottom of the economic hierarchy, inequality has not ceased to grow.

**7. Adding another indicator: life expectancy**

Some calculations of distribution have taken a different route. They have estimated the distribution not of the single variable income per head but a combination of variables. The extra variables almost invariably include life expectancy and in the case of the Human

Development Index also include education-related variables. The result of adding such variables is to reduce the degree of inequality observed.

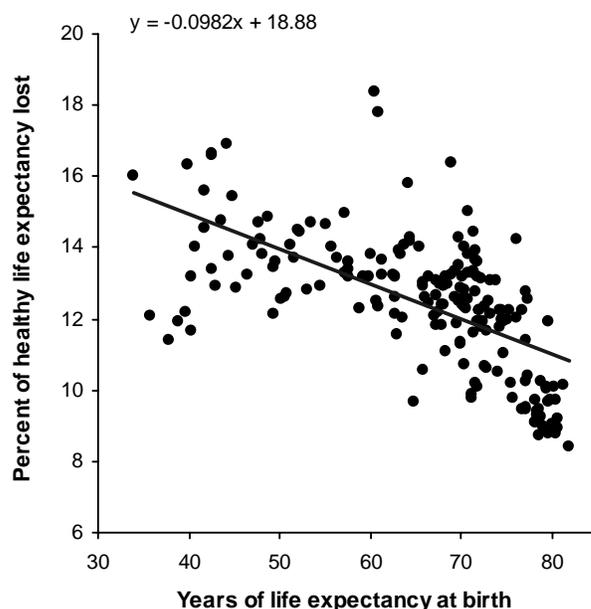
**Table 7: Effects of combining life expectancy and income**

A recent study (Becker et al, 2003) using 10 year moving average data from PWT 6.0 centring on the years 1965 to 1995, starts by confirming that there is no significant relation between the rate of growth of income per head and hence no significant tendency towards convergence. They then observe that life expectancy figures do show convergence during the period. Combining the two to produce the statistic “full income” they obtain the result that there is a significant negative relationship between the growth of full income and the starting level of GDP per head, hence there is convergence after all. The convergence of life expectancy outweighs the absence of convergence of average income.

There are a number of problems with this conclusion. First, the assumption that longer life and higher income are seen as alternatives is to say the least debateable. It would be hard to maintain that more years of extreme poverty, hunger or ill health add to welfare. This means that it is dangerous to sum or multiply income and years of life with no reference to quality. It is often assumed that quality rises along with quantity but that is by no means proven. What is sure is that the WHO’s estimates of healthy life expectancy are more unequally distributed than those of life expectancy as shown by the higher coefficient of variation, though they cannot be compared over time because of the absence of data. Figure 4 also shows that there is a marked tendency for the loss of healthy life years to be greater in countries with lower life expectancy. In other words the distribution of healthy life expectancy is more unequal than the distribution of life expectancy as a whole.

**Table 8: Measures of dispersion of life and healthy life expectancy, 2002 (data for 192 countries)**

**Figure 4: Percentage difference between life and healthy life expectancies compared to life expectancy**



R2 = 0.52; p < 0.0001

Source of data: WHO 2003

Note: vertical axis is the difference between life expectancy and healthy life expectancy in 2002 as a percentage of life expectancy.

Table 9: **Coefficient of variation of life expectancy (data for 163 countries)**

Table 10: **Life expectancy and healthy life expectancy, 2002**

Since 1990, however, due to mortality crises first in Eastern Europe and then in African countries affected by AIDS there has been divergence of longevity. During that time in 42 countries life expectancy either fell or was constant. Their average life expectancy in 1990 was 57 years. The average for the remaining 147 countries which made longevity gains was 66 (World Bank 2003). Gains in life expectancy from 1990 to 2001 are (weakly) positively correlated with initial levels of life expectancy, the opposite of what Becker et al found for 1965 to 1995 so it is doubtful that their conclusion would remain valid. Table 9 shows how for 163 countries the coefficient of variation of life expectancy fell up to 1990 and then rose again in the last decade.

But the sample of 49 countries which they use would in any case not pick up this change. 23 of these are developed countries (the UK being divided into three); they contained in 1995 a population of 812 millions, being 89 per cent of the 51 countries counted by the World Bank as high income countries. 29 countries are developing and their population in 1995 was 485 million, being a mere 10 per cent of the 156 countries counted by the World Bank as in the middle and low income categories. Egypt is the only African country in the sample whereas it is in Subsaharan Africa, with no countries in the sample, that the multiple examples exist of countries with falling real incomes and more recently falling life expectancy due mainly to higher AIDS-related deaths; these facts are not alluded to in the paper. In view of this

extremely lop-sided sample it is hard to see how anything valid about the evolution of world inequality can be concluded, independently of the effects of AIDS.

Bourguignon and Morrison in their long term inequality study also combine income with life expectancy. That reduces the growth of inequality for a time but then the boost to equality given by more equal life expectancies comes to an end and the two move in tandem. This change is not due to the AIDS mortality crisis since their estimates finish in 1992.

The life expectancy indicator is only used as a national average even when (as in Bourguignon and Morrison it is combined with an estimate of global inequality which takes internal distribution into account). This is almost inevitable due to shortage of data. Nonetheless there are enough partial studies to suggest that the intra-national distribution of life expectancy is very unequal. In countries which have lost years of life expectancy due to AIDS that inequality is growing. AIDS in South Africa, as in most other places, is above all a disease of the poor, and in South Africa that means the black part of the population. Health indicators have always shown stark differences between blacks and whites: white life expectancy in 1997 was about 70 years for men and 77 for women. The black figures were 52 and 55 and the colour gap has grown since then. Sample surveys indicate that the incidence of the disease closely reflects position in the class and colour hierarchies. About 50 per cent of black unskilled workers are living with HIV compared with 17 per cent of white unskilled workers. For skilled workers the figures are 40 and 9 per cent and among junior managers 23 and 8 per cent. Low pay, job insecurity and an enormous rate of unemployment among black South Africans are crucial determinants of the patterns of social and sexual contacts in which the virus spreads.

#### ***8. Adding even more indicators: the Human Development Index***

The UNDP launched its Human Development Index (HDI) in 1990 not as a measure of inequality as such but as a means of dethroning income per head from its traditional place as the privileged indicator of development. But, as the UNDP emphasized at the time, human development was distributed in a much more equal way than income per head.

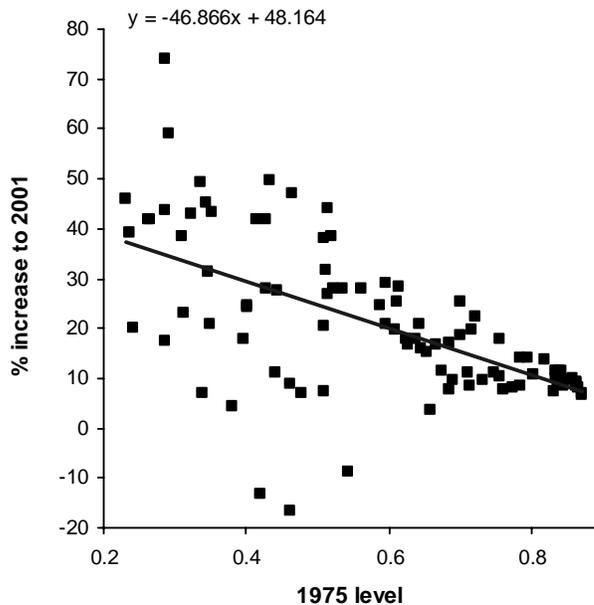
The index is made up of three indicators – the logarithm of income per head, life expectancy at birth and education (a combination of adult literacy and combined enrolment ratios). Plausible maximum and minimum values are assigned to each indicator and the value of each indicator for each country is assigned a value between 0 and 1 according to its position between the extremes (e.g. a country halfway between the minimum and maximum life expectancy would receive a value of 0.5). The HDI is the arithmetical average of these three values and can therefore itself vary between 0 and 1. But nearly all the developed countries are necessarily close to 1. This is because they are approaching an upper limit for life expectancy which seems to be approaching a biological maximum; they are close to 100 per cent levels of literacy and educational enrolment and so approaching a logical maximum (100 per cent) for the combined education indicator. Only income has no logical upper bound, but the difference between poor and rich countries is strongly attenuated by taking the log instead of the actual value; this has the effect of reducing the ratio between the country with the highest and the lowest GDP per head from 63 to 1 to 3.7 to 1. All this this means that the very structure of the index prevents countries with a high level from raising it more than marginally. Countries with a lower level have some way to go and can attain significant percentage increases in the index. The result is that all progress in less developed countries translates into international convergence.

Nicholas Crafts (2000) has pieced together a long-term (since 1870) comparison of the HDI in various countries. It shows, for instance, that while in 1870 the ratio of the HDIs of the USA and India was about 15 to 1 (their values 0.05 and 0.75 respectively) this had been reduced to less than 3 to 1 by 2000. Crafts's comparative historical development statistics are fascinating, but the result that convergence had taken place is almost an inevitable one.

Divergence is almost impossible. Even the mortality disaster of the 1990s in Africa has not yet increased the dispersion of the HDI, as can be seen in Table 10 (based on the UNDP's own historic statistics) which shows a steadily declining coefficient of variation and also in Figure 5 which shows that during the 26 years the HDI tended to increase more rapidly for countries with a lower level of the index in 1975.

Table 10: Coefficient of variation of HDI among 99 countries, 1975–2001

Figure 5: Graph of percentage increase in HDI level 1975–2001 compared with level in 1975



R<sup>2</sup>=0.37

p<0.0001

Source: UNDP 2003

There are small signs of the AIDS epidemic in the HDI. Between 1980 and 2001 the HDI declined in 8 countries out of 103; between 1995 and 2001 the figure was 18 declines out of 140 countries. This will quite possibly continue and may stem the tide of HDI convergence a little.

HDI convergence, however, is more a logical than an empirical result, arising from the index's definition, and so is of little interest in the debate about world inequality. An index of development is not the same as an index of welfare. This is not to deny its usefulness in the purpose it was designed for, namely, to present an alternative definition of development

which might encourage policy makers to give more stress to, for example, improving education and health and less to maximizing income growth.

The conclusion about the convergence of the HDI has, however, been seized on to mitigate the acknowledged down side of the long run economic history of the modern world economy – for instance, by the IMF (not hitherto a devotee of alternative concepts such as human development) in its somewhat triumphalist assessment of the 20<sup>th</sup> century. (IMF 2000)

### ***9. Summing up the evidence***

My aim in this paper is not so much to find a definitive answer to the question of what has happened to inequality as to disentangle some of the confusing and contradictory conclusions which have been arrived at, to make them make a little more sense, to show how they are interconnected and to evaluate some of the conclusions which are drawn from them. There is much we shall never know in detail, but also much which will still be discovered.

Comparing methods and results we can say in summary that those methodological choices most likely to produce the result that inequality has increased more or declined less are:

- Use unweighted national GDP per head observations
- Compare national values using exchange rates (but not since 1995)
- When using PPP data use Maddison's data set rather than PWT 6.1 or WDI
- Use data directly derived from household studies rather than “processed GDP per head figures”
- Compare ratios of extremes rather than (or at least as well as) integral measures

And those choices most like to produce the result that inequality has declined more or increased less are:

- Use population weighted national GDP per head observations
- Compare national values using purchasing power parity estimates (but not since 1995)
- When using ppp data use WDI or PWT 6.1 rather than Maddison dataset
- Use GDP per head figures “processed” by distribution figures
- If comparing ratios of extremes look at the less extreme (e.g. 50/50 or 20/20)
- Add another variable, especially life expectancy (but probably not since 1990)

There are many answers because there are many choices which make significant differences to the results. Some of them are obviously wrong; but when they have been eliminated more than one answer will still remain because there is more than one question. The reduction in Gini coefficients after 1980 in studies which use GDP figures by themselves or with quintile distribution figures does reflect the disproportionate rise in income of a few countries – especially China, but also other Asian countries – which has been sufficient to offset the statistical effect of countries experiencing economic decline. Nonetheless these results are conditionally contradicted by Milanovic's calculation based directly on household surveys which gives more weight to internal differences. It is to be hoped that further research in this direction will clarify whether the same discrepancy exists for a longer period.

I also attach a lot of importance what has happened to the ratios of extreme incomes. These may tell a more powerful story in relation to global social justice than the integral measures; and they highlight important changes which are hidden by the integral measures of inequality such as the Gini coefficient. Whether or not the integral measures show convergence, the ratios of extremes reveal rising polarization between the top and bottom groups. This

conclusion mirrors a similar one for the USA and some other developed countries (Krugman 2002).

I am not at all persuaded that the addition of life expectancy eliminates the presumption of divergence between countries. The hypothesis is based on the idea that income and longevity are substitutes so low welfare due to poverty can be compensated by being poor for a longer time. It is true that if you present almost any group of people with a choice they will choose longer life. But it is not a real choice that anyone is able to make. Longevity does not change current economic welfare. It is more analogous to the distribution of wealth rather than of income.

More importantly, any tendency of the distribution of life expectancy to offset the tendency of income not longer exists, due almost entirely to the HIV/AIDS epidemic. During the period 1990 to 2001, life expectancy figures show overall divergence between countries.

My main conclusion is that it is futile to summarize anything as complicated as world inequality in a single figure. The world is made up of innumerable specific inequalities; whenever anything changes then some of these get worse and some get better. A single statistic may indicate that overall there is some kind of convergence or that the average degree of inequality is declining. But that is little comfort to the bottom fifth of the population of Tanzania who in 1980 received about 4.5 per cent of the world's average income and now they have 3.3 per cent. No doubt most of them do not know that fact but do know that their welfare and living standard has been lacerated. It also probably does not give much comfort to the members of the top 20 percent of the USA to know that while in 1980 they received 240 times more than the poorest Congolese they now get 422 times more. Again they probably do not know that fact; but they do know that they are well ahead of the pack and at the material level lack nothing. Such dramatic contrasts could of course be multiplied. In that case it is surely not enough to take the movement of the Gini coefficient or some other integral measure and conclude that during the period mentioned world distribution has improved. This is not an argument against looking for integral measures; but they are not the end of the debate. To get a more multidimensional picture of actually existing inequality it is imperative to look at it from many angles and that means to look at many different statistics. In particular I have stressed the importance of seeing not only the integrated measure but also the movement of the extremes. When this is done a different picture of the movement of inequality in the period begins to emerge: one in which those around the centre of the distribution are to some extent drawing together after centuries of increasing inequality but where at the same time the extremes have been flying apart. This is not a step along a Kuznets curve in which inequality rises while the late starters catch up one by one but is a prelude to greater equality later on as everyone finally crosses the productivity and income barrier. There is no sign at all that either the extreme impoverishment at the bottom or the extreme enrichment at the top of the world distribution are coming to an end.

The debate is undoubtedly infected with a good deal of inequality denial. This is what is behind the considerable interest shown in suggestions that divergence has been replaced by convergence in the last two decades. Even if this were true it is important to stress that there are signs that it will be short-lived and world inequality, however measured, remains very close to its highest historical levels (see Table 6). The fact is that the level of the Gini, calculated using ppp income and imputing income to population quintiles or deciles for all countries with published distribution figures, is 0.6332. With one exception this is a higher level of inequality than for all countries of the world (including such bywords for inequality

as South Africa and Brazil). The exception is Namibia, a country still showing the economic legacy of *apartheid*. The world ratio of the income of the top 10 percent to the bottom 10 per cent was about 64 (see Table 6). On this measure 9 countries are more unequal than the world as a whole, including Brazil and South Africa. This appalling fact would remain true even if the trends towards convergence discussed above continued for another 20 years.

## 10. Inequality and globalization

It has become common to see the last two hundred years of the world's economic history in terms of different phases defined by globalization. The nineteenth century (ending for this purpose in 1914) is seen as an epoch of growing globalization: international trade and investment generally grew along with, or faster than, the growth of production and there was considerable free trade and relatively free movement of capital, international investments reaching an extraordinary peak in the two decades before World War I, and there was considerable freedom of movement of people from Europe to the USA. The period encompassing the two World Wars and finishing with, say the Marshall Plan in the late 1940s is seen as one of retreat from globalization: protectionism was the rule, the international flow of capital for the most part dried up as did the migration to the USA and the international monetary system broke down. Since 1950 international economic institutions and national politics and ideologies have increasingly favoured more international movement of goods, services and capital, though not so much people. Since about 1980 globalization, meaning the encouragement of free world markets in everything except labour, has been especially encouraged by the purveyors of the ruling economic ideology. Trade and long term investment have continued to grow faster than production, although relative short term capital movements have been much more erratic as has the movement of labour.

Is it possible to see any relation between this broad pattern of globalization and world inequality? Most of the data we have is country-wide data for income per head and population. This, according to Maddison's data, shows a continuous increase in inequality from 1820 to 1980, seemingly not affected by fluctuations in the degree of globalization. Other studies have suggested that during the retreat from globalization convergence between wage levels of the richer countries ceased or went into reverse; and yet others have stressed that during the same period some of the less rich countries began to converge with the richer ones (something which has been a strong element of many dependency theories).

The problem, however, seems to be a long way from any kind of clear definition which would allow of any empirical test. If the answer has to be a statistical correlation between a single variable which stands for globalization and another which stands for inequality then the question is both conceptually and practically unanswerable. Globalization is a concept which receives many definitions, some of them contradictory. The period since 1980 is widely seen as one of particularly strong globalization. But in this case what is globalization? Is it those aspects of the world economy which became more liberal and led to greater integration? Does it also include those aspects which were anything but liberal? In other words is globalization loosely what happens during a period which has been widely called globalizing or just those things which more specifically expanded global interchanges of goods, capital and people. The amount of globalization in the second sense during the present period of globalization in the first sense has been greatly exaggerated (Sutcliffe and Glyn 2003). Trade, international investment and international capital flows have, of course, all relatively expanded but the expansion has been especially concentrated between the countries which were rich at the beginning of the period and it has been limited by the maintenance of very high

discriminatory protection in some sectors of rich country markets (especially agriculture). In addition, political interest in systematic international redistribution in the form of development aid has sharply declined in the last two decades. Aid is now only about 0.2 per cent of the income of the donor countries. Considerably greater redistribution is effected by the repatriation of wages by immigrants from the South working in the North. In both cases, however, there is no correlation between the amount of aid or remittances which countries receive and their level of income per head. So while these mechanisms may produce some specific redistributions, they are not responsible for any general redistribution.

Historical studies of the relationships between globalization and imperialism have stressed their limitations, complexity and ambiguity. At most, concludes Kevin O'Rourke in a survey article, the effect has been modest, and that on the question as a whole 'the literature provides ambiguous answers' (O'Rourke 2001: 29–32). In the same article he argues that the relationship between globalization and inequality varies according to the initial endowments of countries, policies pursued and many other factors. The individual cases are more instructive than general patterns. While in the late nineteenth century there was divergence between the more developed countries and others and some convergence between the richer group (basically the USA, Canada and Western Europe), of which 70 per cent was due to labour migration.

Inequality has as many meanings as globalization. This article has reviewed integral measures of inter-country and global inequalities, but has also added some calculations of intermediate levels of distribution. It is striking that when we disaggregate income figures by continent major differences emerge, the recent convergence of Asia contrasting sharply with the strong and continuous divergence of Africa and the less marked divergence of Latin America from the developed economies. Other disaggregations either between countries or between classes within countries, or combining the two as in the ratio of extremes measures are necessary to be able to appreciate the complex changes which are taking place in inequalities. There remains much research to be done on this.

Disaggregation can be applied also to globalization side of the equation. Policies and tendencies can be identified with have enabled particular countries to benefit by increasing involvement in the world goods and capital markets. The countries of Asia by a combination of high investment, and the mobilization of competitively cheap labour have experienced historically unprecedented rates of growth of the economy, of industrial production and of exports. Some of this growth has been aided by imports of foreign capital but that, in common with the export of manufactures has been very unequally distributed. In 2001 the population weighted Gini coefficient of net inflows of foreign direct investment was 0.7000 which makes it more unequal than any of the measures of world income distribution. The integration of product and capital markets has, of course, been much smoother and complete among developed countries than between them and developing countries and this itself must have led to some of the effect of globalization on inequality. A number of studies have tried to conclude that for poor countries an improvement in their incomes (and consequently a reduction in world inequality) was within their own control. They had only to adopt the market reforms almost universally promulgated during the last 20 years and their growth rates would benefit. This conclusion, however, is increasingly contested. And it ignores the fact that integration into some world markets was not under poor countries' control. This is particularly true of the world labour market, the global liberalization of which has never been part of the neo-liberal prescriptions. In fact, most richer countries immigration laws have been continuously tightened in the last 20 years, although sometimes without the apparently

intended results. This fact is important in view of the opinion of Hatton and Williamson () and others that the freedom to migrate from Europe to the USA during the late nineteenth and early twentieth century reduced the inter-country distribution between the USA and Western Europe and so mitigated the forces which were at the same time making for greater inequality on a global scale. As was seen in earlier sections, something of that pattern remains today. On all these partial issues there remain a host of further research possibilities.

A different question relating to the disaggregation of integral measures of distribution is the subject of vigorous debate (see Milanovic, Quah, Sala-i-Martin). This question is not the overall measure of inequality but the shape of international income distribution – in particular, whether it is or is becoming uni-modal or whether it remains as it has for a long time been bi-modal, or indeed whether it is even becoming tri-modal. This answer to this is crucial to finding the relationship between globalization and inequality. Different modalities in distribution correspond to different concepts of globalization. If the distribution is coming to resemble the uni-modal one typical of a single country. This would not necessarily alter measures of inequality such as the Gini coefficient. But it could be taken as evidence that a unified capitalism was establishing itself on a global scale and that the international fissures in the system produced by imperialism were abating, a hypothesis which is become increasingly frequent. But if the world distribution remains strongly bi-modal, if countries still only very rarely pass from the less privileged to the more privileged group, then this would be strong evidence that the obituaries of imperialism have been premature. Some might see such a result as an indication that globalization continued to be the agent of imperialism; for others it might mean that the preservation of imperialism was the result of the partial and biased nature of recent globalization, something made possible precisely by the continued imperialist relationship. This is tempting interpretation of the failure of the WTO conference at Cancún. This interpretation would see actually existing globalization as being, as well as something of a mess and something of a myth, also something of a fraud.

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## Tables

Table 1: Comparative measures of welfare between countries, 1950–2001

	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001
1. Ratio of average GDP per cap. of 10 highest to 10 lowest countries	36.2	35.8	33.9	31.7	32.7	32.0	32.2	30.1	34.2	39.2	47.0	47.2
2. Coefficient of variation, GNI per cap. ppp (145–163 countries)	1.591	1.538	1.425	1.226	1.221	1.120	1.057	1.005	1.059	1.071	1.084	1.075
3. Coefficient of variation, GNI per cap. ppp (124–160 countries)							1.110		0.985		1.011	
4. Coefficient of variation, GNI per cap. exchange rate (107–149 countries)					1.230		1.299		0.957			
							1.368		1.387			
									1.508		1.475	
5. Gini coefficient (unweighted by population) (145–163 countries)	0.549	0.551	0.545	0.533	0.539	0.530	0.525	0.517	0.536	0.538	0.545	0.543
6. Coefficient of variation, Life expectancy at birth			0.233		0.204		0.183		0.173		0.180	

Sources: Rows 1, 2, 5: Maddison 2003; Rows 3, 4, 6: World Bank 2003

Note: There is a break in some series in 1980 and 1990 due to a change in the number of countries included. In rows 2 and five the break is due to dividing the former USSR, Yugoslavia and Czechoslovakia into their present component countries.

Table 2: Evolution of Gini coefficient of North and South calculated separately

	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2001
1. Gini coefficient, North	0.2899	0.2525	0.2057	0.1748	0.1254	0.1089	0.1036	0.1085	0.1028	0.1011	0.1017	
2. Gini coefficient, South	0.4116	0.4012	0.4071	0.4275	0.4438	0.4576	0.4521	0.4158	0.3958	0.3630	0.3479	
3. Gini coefficient, Africa	0.2904	0.2813	0.2950	0.3053	0.3236	0.3265	0.3586	0.3769	0.3666	0.3820	0.3982	
4. Gini coefficient, Latin America	0.2524	0.2477	0.2353	0.2458	0.2333	0.1915	0.1764	0.1635	0.1623	0.1767	0.1872	
5. Gini coefficient, Asia	0.2097	0.1932	0.1882	0.2145	0.2595	0.3131	0.3279	0.3016	0.3029	0.3171	0.2977	
6. North/South income ratio	5.18	5.41	5.39	5.90	6.17	6.09	6.30	6.53	6.92	6.84	6.67	
7. North/Africa ratio av. income	6.32	6.97	7.34	8.03	8.58	9.19	9.75	11.22	13.01	14.64	15.12	
8. North/Latin America ratio av. income	2.25	2.44	2.50	2.80	2.92	2.78	2.77	3.26	3.72	3.64	3.87	
9. North/Asia income ratio	8.91	9.08	9.15	10.28	10.57	10.12	10.02	9.25	8.87	7.39	6.91	
10. North/China income ratio	12.87	11.89	11.63	13.62	14.86	14.91	14.03	10.83	10.11	7.49	6.28	

Source: Author's calculations based on Maddison 2003

**Table 3: Projected values of Gini for 2010–2050 (based on extension of growth of population and income per head and trend of exchange rate between 1990 and 2000)**

	2000	2010	2020	2030	2040	2050
Maddison 2003	0.5367	0.5262	0.5315	0.5469	0.5813	0.6543
WDI 2003 (not ppp)	0.7559	0.7400	0.7198	0.7040	0.6942	0.6980

Sources: authors calculations based on Maddison 2003 and World Bank 2003

**Table 4: Global Gini coefficients 1960–2000**

	1960	1970	1980	1990	2000
Bourguignon & Morrison 2002 (Maddison 95)	0.635	0.650	0.657	0.657*	
Sutcliffe 2003 (Maddison 2001)			0.667	0.650	0.627
Sala-i-Martin 2002 (PWT 6.0)		0.657	0.662	0.654	0.633

Sources: Bourguignon and Morrison 2002, Sutcliffe 2003, Sala-i-Martin 2002a

\* = 1992

**Table 5: Inter-country ratios of extremes 1950–2000**

	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000
Ratio of 80 <sup>th</sup> to 20 <sup>th</sup> percentile	6.47	5.76	5.92	7.75	8.07	7.02	6.85	6.21	5.25	3.92	3.78
Ratio of 90 <sup>th</sup> to 10 <sup>th</sup> percentile	13.66	12.74	11.45	13.26	13.84	13.78	15.05	15.56	16.43	17.00	17.14

Source: author's calculations based on Maddison 2003

**Table 6: Global ratios of extremes, 1980–2001**

Using WDI 2002 figures

	1980	1990	2000
Gini coefficient	0.667	0.650	0.627
Richest/poorest 50%	13.62	10.21	8.83
Richest/poorest 20%	45.73	33.85	29.49
Richest/poorest 10%	78.86	64.21	57.41
Richest/poorest 5%	120.75	101.02	116.41
Richest/poorest 1%	216.17	275.73	414.57

Using Maddison 2001 figures

	1980	1990	1998
Gini coefficient	0.639	0.633	0.629
Richest/poorest 50%	10.4	9.1	8.9
Richest/poorest 20%	33.0	30.5	23.1
Richest/poorest 10%	58.2	54.9	61.1
Richest/poorest 5%	139.4	98.6	123.1
Richest/poorest 1%	214.3	290.6	359.6

Using WDI 2003 figures

	2001
Gini coefficient	0.633
Richest/poorest 50%	8.55
Richest/poorest 20%	30.24
Richest/poorest 10%	63.84
Richest/poorest 5%	139.81
Richest/poorest 1%	613.47

Source: Sutcliffe 2003 and author's calculations based on World Bank 2003

Table 7: Effects of combining life expectancy and income

Study	Income variable	Exchange rate or ppp	Population weighted y/n	Other variable	Result
Becker et al.	GDP ph	ppp (PWT 6.1)	n	life expectancy	convergence 1965–1995
Bourguignon and Morrison	GDP ph	ppp Maddison	y	life expectancy (discounted future income)	reverses divergence, then stability post 1980
Crafts	GDP ph	ppp Maddison?	n	life expectancy, literacy (i.e. IDH)	long term convergence, 1870–2000
UNDP	GDP ph log	ppp	n	life expectancy, literacy, school enrolment	convergence, 1975–2001

Sources: Becker et al. 2003, Bourguignon and Morrison 2002, Crafts 2000, UNDP 2003

Table 8: Measures of dispersion of life and healthy life expectancy, 2002 (data for 192 countries)

	av	stdev	stdev/av
life	65.4	11.804	0.180
healthy life	57.4	11.108	0.194

Source: World Health Organization, 2003

**Table 9: Coefficient of variation of life expectancy (data for 163 countries)**

	1960	1970	1980	1990	2001
World average	53.2	57.2	60.9	63.8	64.6
Standard deviation	12.414	11.633	11.115	11.033	12.559
Coefficient of variation	0.233	0.203	0.183	0.173	0.194

Sources: author's calculations based on World Bank 2003

**Table 10: Life expectancy and healthy life expectancy, 2002**

	Life expectancy at birth		Healthy life expectancy at birth	
	Both sexes	Female	Both sexes	Female
World average	65.4	63.1	67.9	58.9
Standard deviation	11.804	11.283	12.431	11.595
Coefficient of variation	0.180	0.179	0.183	0.197

Source: author's calculations based on World Health Organization 2003

**Figure 10: Coefficient of variation of HDI among 99 countries, 1975–2001**

	1975	1980	1985	1990	1995	2001
av	0.598	0.625	0.645	0.663	0.682	0.700
stdev	0.197	0.193	0.189	0.190	0.195	0.197
stdev/av	0.330	0.308	0.293	0.287	0.285	0.281

Source: Author's calculations from UNDP 2003