The Changing Shape of Global Inequality 1820–2000; Exploring a New Dataset

Article *in* Review of Income and Wealth · January 2011

DOI: 10.1111/roiw.12014

4 authors:

Jan Luiten van Zanden
Utrecht University
328 PUBLICATIONS 2,644 CITATIONS

Joerg Baten
University of Tuebingen
137 PUBLICATIONS 1,907 CITATIONS

Peter Foldvari
University of Amsterdam
48 PUBLICATIONS 210 CITATIONS

Bas Van Leeuwen
Utrecht University
61 PUBLICATIONS 441 CITATIONS

Center for Global Economic History

Universiteit Utrecht

CGEH Working Paper Series

The Changing Shape of Global Inequality 1820-2000: Exploring a new dataset

Jan Luiten van Zanden, Utrecht University

Joerg Baten, University of Tübingen

Peter Földvari, University of Debrecen

Bas van Leeuwen, Utrecht University

January 2011

Working paper no. 1

http://www.cgeh.nl/working-paper-series/

The Changing Shape of Global Inequality 1820-2000
Exploring a new dataset

Jan Luiten van Zanden, Utrecht University

Joerg Baten, University of Tuebingen

Peter Földvari, Debrecen University

Bas van Leeuwen, Utrecht University

Abstract
A new dataset for estimating the development of global inequality between 1820 and 2000 is presented, based on a large variety of sources and methods for estimating (gross household) income inequality. On this basis, and two sets of benchmarks for estimating between-country inequality (the Maddison 1990 benchmark and the recent 2005 ICP round), we estimate the evolution of global income inequality and of the number of people below various poverty lines over the past two centuries. We find that between 1820 and 1950 increasing per capita income is combined with increasing global inequality, and with an increase in the absolute number of people below the poverty line. After 1950 global inequality as measured by the Gini coefficient remains more or less constant, and also the number of poor starts to decline in absolute terms. It also appears that the global income distribution was uni-modal in the 19th century, became increasingly bi-modal between 1910 and 1970 with two world wars, a depression and de-globalization, and was suddenly transformed back into a uni-modal distribution between 1980 and 2000.

Keywords: income inequality, historical development, world, regional development, Gini.

JEL Codes: N10, D31, D63

Corresponding author: Jan Luiten van Zanden, jvz@iisg.nl

Acknowledgements: We thank the participants at the conference on "A Comparative Approach to Inequality and Development: Latin America and Europe" Madrid May 8-9 2009 and of the session on Global Inequality at the XVth World Economic History Congress, Utrecht 2009, for their comments on the first draft of this paper. We thank Dorothee Crayen, Robert Fogel, Nadine Frerot, Ricardo Godoy, Laurent Heyberger, Michał Kopczyński, Kerstin Manzel, Stephen Nicholas, Sunyoung Pak, Valeria Prayon, Inas Rashad, Daniel Schwekendiek, Mojgan Stegl, Yvonne Stolz, Linda Twrdek and Greg Whitwell for contributing their data.

1. Introduction

The aim of this paper is to present a new dataset of global inequality between 1820 and the present, based on the available historical evidence, and to analyse the main results that emerge from these data. The importance of the subject hardly needs to be stressed: the enormous increase of inequality on a global scale is one of the most significant – and worrying - features of the development of the world economy in the past 200 years. For this reason, the subject has become one of the most discussed topics in the social sciences; in particular the debate on the measurement and interpretation of recent trends in global inequality – is it still increasing? and why or why not? – has attracted considerable attention (Deininger and Squire, 1996; Jones, 1997; Bourguignon and Morrisson, 2002; Milanovic, 2007 for a review of the debate).

Our aim is to present a new dataset of global inequality, because we think we lack the historical data to really analyse these patterns of changing global inequality in detail. The one paper that has attempted to do this, Bourguignon and Morrisson's (2002) article, is for the period before 1950 largely based on the assumption that income inequality within countries is unchanging. They extrapolate their estimates of income inequality in certain periods to cover much longer time periods, as a result of which changes in income inequality within countries are clearly underestimated. For large parts of the world this means that estimates from the post 1914 or even the post 1945 period are used to infer income inequality in the 19th century. For Latin America and Africa Bourguignon and Morrisson (B & M) rely completely on 20th century data to estimate inequality in the 19th century; for Asia they have in total four historical estimates: one for China in 1890, two for Indonesia and one for Japan. The dataset for Europe and North America is somewhat better, but also uses only part of the evidence available. For a large majority of the world's population, and almost all people living in the 'developing countries', their estimates are based on almost no historical evidence, implying that we really cannot rely on their work to analyse the long term patterns of global inequality. Moreover, scholars interested in the question whether, for example, waves of globalization (1870-1914) and deglobalization (1914-1950) had an effect on global income distribution, cannot use this dataset to analyse such a possible link, as it simply does not have sufficient historical observations to make such an analysis feasible.

Finally, it should be pointed out that the B & M estimates rely on Angus Maddison's (2003) reconstruction of the long term development of GDP per capita in different parts of the world economy between 1820 and 2000. He uses the 1990 benchmark of the ICP to get estimates of relative levels of income in the world economy. Recent research by the ICP has however resulted in a new set of PPP's, for 2005. This modification changes the relative level of per capita GDP across countries and, since, per capita GDP is used to calculate between country income inequality, clearly has consequences for the estimates of the long term development of global inequality (World Bank 2008).

For these reasons, we have set out to create a new dataset to measure the evolution of global inequality in the 19th and 20th centuries. Our main contribution is that we greatly enlarge the number of observations of within country inequality on which the estimates are based (B & M had 362 country Gini coefficients, we have more than a thousand). Moreover, we also aim at finding out the consequences of using the new 2005 benchmark (as will be shown below, our results are largely consistent with the detailed study by Milanovic 2009 on this topic). However, because the new 2005 benchmarks have not been completely accepted by the international community of scholars (in particular the late Angus Maddison was quite critical about these new results), we present two sets of estimates of global inequality, one based on the 1990 (Maddison) benchmark (which are also comparable with the B & M results), and one based on the new but still tentative 2005 benchmark. For the latter set of estimates we used the new 2005 PPPs as starting point, and applied for the different countries involved, the growth rates of GDP per capita as estimated by Maddison (2003) as the best summary of our knowledge for the changes over time.[1] We do not deal with the discussions about the reliability of the Maddison dataset and the underlying estimates of the growth of the countries concerned since this is sufficiently available in the existing literature.[2]

The paper is set up as follows. In section 2 we outline how the new dataset was constructed. Firstly, new research done since the 1990s and older research overlooked by B & M were incorporated in the new dataset. This, however, does not really solve the problem of the data gap between rich and poor – probably the gap even widens, as much more evidence is available and much more work has been done on Europe and the Americas than on Africa and Asia. Therefore, in order to get a more balanced set of estimates, we had to apply two alternative ways of estimating (changes in) income inequality suggested in the literature. The first one, which we particularly used for the 19th century (and for a few countries also to the interwar period), was to infer changes in income inequality from the development of the ratio between GDP per capita and real wages of unskilled laborers. The idea, initially suggested by Jeffrey Williamson (1998, 2000), and recently tested by Leandro Prados de la Escosura (2008) is that, if wages lag behind income per capita, inequality is probably increasing; conversely, if wages grow faster than GDP per capita, this points to a decline in income inequality. We tested this relationship for a set of countries for which we had independent estimates of inequality of income distribution, and found a small but (just) significant effect, which we used to extrapolate (or intrapolate) estimates of the Ginis of income distribution.

---

[1] The debate about the quality of the 2005 ICP estimates has mainly focused on the Chinese PPP's; we follow Heston's re-estimates of the Chinese PPP's (which correct for the possible biases) by adopting the version of the 2005 PPP's published on the website of The Conference Board: (http://www.conference-board.org/economics/database.cfm); for further confirmation that the new –and for China the adapted version of the new – PPP's are of high quality, see Ravallion (2010).

[2] The relative position of the US versus the UK is still a matter of considerable debate (Broadberry 2003; for underestimating GDP per capita of the US during much of the 19th century, see Ward and Devereux 2005), but it is not clear that this will affect the overall pattern of global inequality very much. There has also been some discussion about GDP per capita development in China (and other parts of Asia) after the late 18th century (Pomeranz 2000, but see Li and Van Zanden 2010, who more or less confirm the Maddison estimates on the basis of independent benchmark estimates).

The second new approach that we applied is to use data on the distribution of heights of the population that can be derived from different sources to estimate the Gini of the income distribution. Again, for a subset of countries for which we have both independent Gini coefficients of income distribution and data on the distribution of heights, we could establish the link between the two measures of socio-economic disparities. The found relationship is then used to estimate income inequality for those countries and periods for which other data were lacking. This procedure has been developed by Baten (1999) and Moradi and Baten (2005), and has now been extended to a much broader sample of countries (all details below).

Moreover, we identified a group of 30 countries – most of them relatively large, but spread more or less equally over the globe (with an inevitable over-representation of Western Europe, however) – for which we tried to get consistent estimates of income inequality for all the benchmark years, starting in 1820. These countries were: (in Europe) Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Poland, Portugal, Russia/USSR, Spain, Sweden, Czechoslovakia, UK; (in Asia) China, India, Indonesia, Japan, Thailand, Turkey; (in the Americas) Argentina, Brazil, Canada, Chile, Mexico, Peru, USA; (in Africa) Egypt, Ghana; and Australia. Together, these countries represent 70-80% of the world's population (according to the Maddison estimates). We think this dataset is more or less representative of global trends, although it is handicapped by the underrepresentation of in particular Africa and the overrepresentation of Western Europe. In the analysis presented below we therefore considered all countries with 500,000 and more inhabitants and added all countries for which we have observations, even those for which we have only a few – and sometimes only one – data point (Botswana in 1990, for example).

Finally, we aggregate these individual level data into one world Gini. This Gini is by definition lower than the population weighted average country Gini's because the distributions of different countries overlap. Since these world income inequality estimates are, to a large extent, based on new data, we provide error margins in Section 3. In Section 4 we discuss the development of inequality on a regional and world level. We end with a brief conclusion.

2. Data

2.1 Income inequality in post-1945 period

Data on income inequality is relatively scattered. However, for the twentieth century two important sources may be distinguished that contain direct information on income inequality. First, there are the direct Gini-coefficients. One major source is the WIID (2008). These cover most of the period after 1950. However, these estimates are not completely consistent. As pointed out by François and Rojas-Romagosa (2005) and Solt (2009, 235), three broad groups can be distinguished based on gross household income, net household income and expenditure data. These are not mutually exchangeable because the trend in these data is different (François and Rojas-Romagosa 2005, 16). Hence, they classify the data from the WIID according to these three classes. The major actor causing a different trend in these classes is income/expenditure smoothing: progressive taxation, extra earnings from by-employment, and the black economy all contribute to some kind of smoothing of expenditure and net income. In addition, the wealthy are expected to save a larger share of their income, and therefore the observed expenditures are far from being a linear function of income. Finally, François and Rojas-Romagosa (2005, 17) point out that expenditure measures are subject to bias caused by borrowing or lending. These factors are especially prevalent in the post World War II period when many countries expanded their income taxation. However, as suggested by Van Leeuwen and Foldvari (2009) for Indonesia, it seems that there is only a relative short transition phase when income taxes gain ground. This means that, as a general rule, both before and after a relatively short transition period after WWII, the trends in the net household income, expenditure Ginis and the gross household income gini are again similar. We test this hypothesis for a larger sample of countries in regressions, where we regress the gross household Gini prior to 1980 (and after 1980) on the net household income Gini, a trend, a cross effect of trend and net household income Gini.

In the period prior to 1980, the cross-sectional effect is significant and positive, implying that the net household Gini grows slower than the gross household Gini (Table 1). If we compare the same regression from the period after 1980, where we may reasonably assume that there is a linear relationship between the gross and net household Gini, we indeed find none of the coefficients significant. We prefer to use the gross household Gini's as these are the most abundant (61% of the sample consist of gross household Ginis). However, when such data are unavailable, we apply the regressions of Table 1 to transform net household and expenditure Gini's into their gross household equivalents.

2.2 Direct estimates for the pre-1945 period

Reworking the WIID dataset is a first step. A lot of new work has recently been done on the estimation of income inequality in the past that can also be included in the dataset. This consists of two things: direct Gini coefficients can be obtained from several other, mostly scattered publications. A good overview of a lot of the historical work is supplied by Milanovic, Lindert and Williamson (2007), and on the Global Income and Prices website at UCDavis (http://gpih.ucdavis.edu/Distribution.htm). New work has also been done (and old work has gone unnoticed), by Bertola et al. (2009) for parts of South America, Rossi et al. (2001) for Italy, Bergson (1984) for the Soviet Union and Soltow and Van Zanden (1998) for the Netherlands.

A separate category of new work is related to income share estimates, in particular the project focused on estimating the historical development of the share of the richest 1 or 5 %

in total income, inspired by the work of Piketty and Atkinson.[3] One problem, however, is how to convert these income shares, which are nothing more than just one point on the Lorenz curve, into Ginis. The only way this can be done is by assuming a distribution. Two distributions have been proposed - a log-normal and a Pareto distribution – but the literature suggests that when the whole distribution is covered, the log-normal is to be preferred (see Soltow 1998). Lopez and Servén (2006) show that the Lorenz-curve, under the assumption of log-normality, can be expressed as follows:

$$L(p) = \Phi(\Phi^{-1}(\mathrm{p}) - \sigma)$$

Where p denotes the poorest p[th] quantile of the population, and σ is the standard deviation of the log income and Φ(.) denotes the cumulative normal distribution.

The Gini coefficient (G) can be expressed as:

$$\sigma = \sqrt{2}\Phi^{-1}\left(\frac{1+G}{2}\right)$$

In the end, it turned out that on average the difference between an assumed lognormal and a Pareto distribution was limited. Van Leeuwen and Foldvari (2009, appendix A.2) point out that their level slightly differs but, since the results are benchmarked on actual Ginis, this does not pose a problem. More interesting is the question if the movement of the Ginis estimated based on the income shares follows the actual development of Ginis. Leigh (2007) shows that this indeed is the case for a sample of countries during the post-war period (see also Van Leeuwen and Foldvari (2009)). As pointed out already, we prefer the log-normal distribution for transformation of these estimates of the share of 1% or 5% in total income into Gini coefficients.

[3] Studies are available for Australia (1921-2003) (Atkinson and Leigh 2007a), Canada (1920-2000) (Saez and Veall 2005), France (1905-1998) (Piketty 2007), Germany (1925-1998) (Dell 2007), India (1922-1999) (Bannerjee and Piketty 2003), Indonesia (1920-2004) (Leigh and Van der Eng 2010), Ireland (1922-2000) (Nolan 2007), Japan (1886-2002) (Moriguchi and Saez 2006), Netherlands (1914-1999) (Salverda and Atkinson 2007), New Zealand (1921-2002) (Atkinson and Leigh 2005), Spain (1981-2002) (Alvaredo and Saez 2009), Sweden (1903-2004) (Roine and Waldenström 2006), Switzerland (1933-1996) (Dell, Piketty, and Saez 2007), UK (1908-2000) (Atkinson 2007b) and the USA (1913-2004) (Piketty and Saez 2006b).

2.3 GDP divided by unskilled wages as a proxy

Above two methods give us a reasonable complete picture of income distribution among countries in the twentieth century. Except for some direct estimates of income inequality available for a limited number of countries often based on 'social tables' not much is known for the earlier period. For estimates of within country inequality before 1914 we therefore often have to rely on proxies for income inequality. Several options have been suggested, such as the income gap between the landed elite and landless labor, or the ratio of average family income (y) to the annual wage earnings of an unskilled rural laborer (w). Both methods draw heavily on the concept of the extraction rate (Milanovic et al. 2007). This rate is defined as the share of total income that is above the subsistence level, which can be assumed to be equal to the earnings of an unskilled labourer. A high extraction rate – in other words, a large surplus above subsistence – implies that potentially income inequality can be very high. The question is which share of this surplus is acquired by the elite.

The basic equation used by Milanovic *et al.* is:

$$G_t^* = \frac{1-\varepsilon}{\mu_t}(\mu_t - s_t)$$

where G^* is the possible maximum Gini, ε is the share of higher class people (assumed constant), μ the mean income (per capita GDP) and s the unskilled income. When taking logarithm of both sides, this becomes:

$$\ln G_t^* = \ln(1-\varepsilon) - \ln \mu_t + \ln(\mu_t - s_t)$$

If we assume that the expropriation of surplus income by the elite is not complete we can have a more general form:

$$\ln G = \ln(1-\varepsilon) + \lambda \ln \mu_t + \gamma \ln(\mu_t - s_t)$$

where -λ=γ=1 is the basic case, with the maximum income diversion. We assume that the share of the elite within the population may differ across countries, but remains constant over time. Also, the term $\ln(\mu_t - s_t)$ is proxied by the log of the Williamson index (y/w^{un}). This results in a panel model with fixed effects, the log of GDP per capita and wage premium being independent variables (see the results in Table 2):

$$\ln G_{it} = \beta_1 \ln\left(y_{it}/w_{it}^{un}\right) + \beta_2 \ln y_{it} + \eta_i + u_{it}$$

To estimate changes in Gini coefficient, we used the regression from Table 2 (including country specific effects) and the fitted values to estimates Ginis for countries/years where we did have the Williamson index but no Ginis.[4]

2.4 The distribution of heights as a proxy

A completely independent method of looking at early inequality is by analyzing the relation between the distributions of heights and of income. For example Baten (1999, 2000, 2000a), Pradhan et al. (2003), Moradi and Baten (2005), Sunder (2003), Guntupalli and Baten (2006) have argued that the coefficient of variance of the height of individuals may be a proxy for income distribution. The idea is that growth takes place especially between age 0 and 5 and that there are no genetic population differences in height (both in time and in space). As wealthier people have better food and shelter and less illnesses, they tend to be taller. Hence, the variation of height at the present of a certain cohort is indicative of income distribution during the decade of their birth.[5]

[4] The sources used for the real wage series were Williamson (1999, 2000a, 2000b), Mitchell (1998 a, b, c), Allen (2001), Mironov (2004), and Allen *et al.* (2010); the estimates of the growth of GDP per capita were again taken from Maddison (2003).

[5] One question to be adressed is whether this measure is vulnerable to survivor bias, as only survivors could be included. But actually, thinking also of gini coefficients of income inequality, there are only inequality measures which measure survivors. To become an income earner in any inequality measure, you have to survice to the age in which people earn incomes. In other words, also the gini coefficient only relates to the living population, and does not reflect inequality of newborn babies who might have died during their first year of life. Moradi and Baten (2005) actually tested whether countries with higher infant and child mortality might have had a

Heights offer a good complement to conventional inequality indicators and constitute perhaps an even better indicator in some respect. If the distribution of food and medical goods in an economy becomes more unequal, heights will also become more unequal. Deaton (2001) and Pradhan et al. (2003) have argued convincingly that measures of health inequality are important in their own right, not only in relation to income. Because they do not assume the existence of a market economy, anthropometric methods can also be used very well for studying developing countries.

The effects of inequality on heights are best understood by comparing the likely outcomes of a hypothetical situation, in which a population is exposed to two alternative allocations of resources A and B after birth:

(A) All individuals receive the same quantity and quality of resources (nutritional and health inputs). This case refers to a situation of perfect equality.

(B) Available resources are allocated unequally (but independently of the genetic height potential of the individuals).

In the case of A, the height distribution should only reflect genetic factors. Despite perfect equality, we observe a biological variance of (normally distributed) heights in this case. Yet how does the height distribution respond to an increase in inequality (B)? The unequal allocation of nutritional, medical and shelter resources allows some individuals to gain and grow taller, while others lose and suffer from decreasing nutritional status. In comparison with the situation of perfect equality, the individual heights of the rich strata shift therefore to the right, the poor strata shift to the left. Thus rising inequality should lead to higher height inequality, although this effect is weakened by the fact that the genetic height variation accounts for the largest share of height variation. Even a bimodal height distribution could result if the resource endowment differed extremely between groups. In practice, since

---

systematically different height CV. They found indeed the expected negative effect. However, only a very small part of the CV's variance could be explained by mortality differences between the countries.

the biological variance continues to contribute a large share to the total variance, most height distributions are normally distributed or very close to normal, but with a much higher standard deviation than A (but see A'Hearn (2004), Jacobs, Katzur and Tassenaar (2008) on late teenagers).

The coefficient of variation (CV) is the measure most often used in this research. Baten (1999, 2000a) compared height differences between social groups using the CV for early 19th century Bavaria, since an ideal data set was available for this region and time period, with nearly the entire male population measured at a homogeneous age and the economic status of all parents recorded. The measures turned out to be highly correlated. Therefore, high CVs sufficiently reflect social and occupational differences without relying on classifications.[6]

Moradi and Baten (2005) have estimated the relationship between income inequality and height coefficients of variation (CV) for 14 African countries and 29 five-year periods. They controlled for the differences in income definition and population coverage by including dummy variables. In addition, country fixed-effects were included (Table 3, model 1 and 3) which implies that their analysis focused mainly on intertemporal effects. They found that height CV was significant and positively correlated with the Gini coefficients of income. An increase in the CV by one unit corresponded with a rise in the Gini coefficient by 13.2 points in the fixed-effects specification. It is noteworthy that the relationship between the CV and the gini coefficient is not sensitive to country fixed-effects in general. In another regression without country fixed effects (2), they obtained a coefficient between nutritional and income inequality of 20.9. Both coefficients were very close to Baten and Fraunholz's

[6] The CV of a totally equal society is yet unknown and can only be empirically approximated. For decomposing world health inequality, Pradhan et al. (2003) tried to standardise height inequality by assuming that the height distributions in OECD countries reflect the genetic growth potential of individuals only. However, this would mean that no nutritional and health inequality exists in OECD countries, which seems highly implausible. In Germany during the 1990s, for example, height differences between social groups were as large as two centimeters (Baten and Boehm 2009; Komlos and Kriwy 2003). Even in egalitarian Scandinavia, some height inequality remains between regions (Sunder 2003).

(2004) estimate for Latin America, which reported a significant coefficient of 15.5 based on gini coefficients whose underlying data are of the highest possible quality. Additional robustness tests including weighting for sample quality confirmed the relationship. Moradi and Baten (2005) recommended the following formula for translating height CVS into income Ginis:

(1) $Gini_{it}=-33.5+20.5*CV_{it}$

They argued that an excellent case for comparing the development of both income and height-based inequality measures is Kenya, for which the estimates by Bigsten (1985) offer a consistent source with a sufficient number of data points (Figure 1). The development of both inequality measures is nearly identical, except for the sudden fall of the gini coefficient in 1955 with which the CV does not correspond. It is actually not clear which of the two inequality measures describes the development better, but it seems that the CV's movement is somewhat smoother and less volatile (the CV might moreover be less volatile due to some consumption smoothing, as people reduce their savings in harder times to smooth their consumption). However, both the strong rise of inequality in Kenya during the early 1950s and the more gradual rise of the late 1960s are clearly visible in both series. Summing up, the development of height CVs over time serves as a promising measure of inequality, even more so because in periods and countries in which other data on inequality are either non-existent or unreliable.

In sum, the relationship between Gini coefficient of income and height CV seems quite well-established. Hence we collected all available data from hundreds of previously published articles (see appendix for a list of references), and benefited from scholars who provided us with their original height data sets. We excluded cases with very small numbers of height measurements, or if only one special group within a country was included. We took care that late teenage year / early twenties samples, military truncation, gender, prison selectivity and other factors did not distort our samples. Finally, we calculated the height CV for each country and birth decade not covered by the income Ginis and converted the CV with the formula (1) into income Gini equivalents.

2.5 Global inequality

Table 4 gives a summary of the sources of the newly constructed dataset. The overall dataset consists of 1078 estimates of Gini coefficients of income inequality, spread over more than 130 countries. The greatest number of new estimates is produced by using the height data, but because these often refer to relatively small countries, the total impact on the estimates of global inequality that will be presented is more limited. The other new sources of estimates – 'new' direct estimates of income inequality, and indirect estimates derived from the GDP/wage ratio – are more often used for the larger countries. When more than one estimate for a country was available, we applied the following rules: a direct estimate of income inequality superseded all indirect estimates, which were in that case ignored; when we had two different indirect estimates, based on heights and on the GDP/wage ratio, we used more or less arbitrarily the unweighted average of the two, which happened in 68 cases (Col. 6 of Table 4). Changing this assumption does not have a big impact on the final results. For example, using for 1850 the Williamson index only instead of the unweighted average will increase world income inequality with 1.18%. To get a systematic set of estimates for the core-group of 30 countries, we had to interpolate a few estimates for those countries.[7]

The unit of analysis and comparison so far has been the Gini coefficient of the individual countries. To move from them to global inequality, we (again) had to assume that

[7] Estimates are complete for following countries: Belgium, Brazil, China, Spain, France, UK, Indonesia, Italy, Netherlands, Portugal, Sweden, USA, Germany, India, Poland, Norway, Ghana and Mexico; interpolations were necessary for Thailand (1850, 1910), Turkey (1850, 1890, 1980), Australia (1820 is assumed to be identical to 1850), Russia/USSR (1850, 1890), Canada (1870), Czechoslovakia (1910), Denmark (1850), Egypt (1890, 1929, and 1820 derived from Turkey) and Peru (1910); for Argentina and Chile in 1820 we did not find a suitable proxy.

the underlying distributions were log-normal, which allows us to translate the Gini coefficient into an estimate of the whole distribution of income in country X at time Y. This is then linked to the estimates of the average GDP per capita in the countries concerned.

The growth rate of per capita GDP is calculated from Maddison (2003) whereas the differences in GDP per capita across countries can be calculated using the Maddison 1990 GK dollars benchmark. Alternatively, recent research by the ICP has resulted in a new set of PPP's for 2005 (Worldbank 2008), which are based on a broader set of prices and on data from much more countries, probably making the 2005 benchmark more reliable than previous ones. This, and the use of a somewhat different method to estimate the PPP's, which solves the problem as noted by Afriat (1967) and more recently by Dowrick and Quiggin (1994), that PPPs in international prices tend to overestimate the level of real GDP in low income countries, results in a substantial widening of income disparities between countries (Deaton and Heston 2008). Yet, since there recently has been some criticisms on the 2005 benchmark as well, we decided to provide the World Ginis both using the 1990 PPPs as used by Maddison (2003) and the new 2005 PPPs.

The resulting estimates are reported in Table 5A and 5B for the 1990 and 2005 PPP benchmarks, the former ones being directly comparable to the estimates of Bourguignon and Morrisson (2002). Global inequality has two dimensions: within country inequality, which is the same for these two sets of estimates, and between country inequality. Table 5 also shows the overlap factor; because of the statistical features of the Gini coefficient, the sum of the within country Gini and the between country Gini is larger than the global Gini. The difference between them is the overlap factor, which is in essence nothing more than that share of the within group inequality of country A that overlaps with within group inequality of country B. This has led Milanovic (2002, 70) to claim that "the more important the overlapping component..... the less one's income depends on where she lives" .

The effect of moving from 1990 benchmark to the 2005 benchmark is very clear from these estimates. Yet, both sets show the same pattern of already quite high levels of global inequality at the start of the period (.54 and .48 respectively). It then increases steeply from .54 in 1820 to .67 in 1929 and .68 in 1950 according to the 2005 benchmark, after which, in both sets of estimates, it more or less stabilizes at that (extremely high) level during the second half of the 20th century.

Table 6 demonstrates that we normally cover between 85 and 94 percent of global population with real data, which is quite high; this percentage tends to increase somewhat during the period under study. On the basis of the Maddison dataset we estimate that the average income of this 85 to 94 share is only slightly higher than that of the world as a whole, but the average income of the uncovered rest is clearly lower than of the countries covered by this experiment (for example, in 1820, the average income of 'the rest' can be estimated to be about 500 1990 international dollars). We therefore more or less consistently underestimate inequality, but the bias does not change (much) over time.

Compared to Bourguignon and Morrisson (2002), our estimates based on the 1990 benchmark are somewhat lower than theirs, and using the 2005 benchmark substantially higher by, on average, 4 points on the Gini index. Their estimates of global inequality increase from a Gini of .50 in 1820 to .61 in 1910, .64 in 1950 and .657 in 1980, whereas the Gini estimated here range from .48 to.54 in 1820, rises to .59 to .64 in 1910, and .65 to .68 in 1950. After 1950 the B & M estimates continue to increase a bit, whereas our estimates show more or less stability (with the exception of the estimates for 1975 and 2000, both based on a more limited number of observations).

3. Error margins

Our estimates above are all based on direct information. However, since we use a large amount of "new" data, and we use a diverse methodology of creating the world income inequality series, it seems necessary to gauge its imprecision. Basically, our estimates consist of two components, the within and the between country inequality. Since the within country inequality is estimated based on several different sets of data, we follow Chapman (1953) and Feinstein and Thomas (2001) who attach standard errors of 1.25% for firm figures, 3.75% for good figures, 8.75% for rough estimates, and 20% for conjectures. The actual gross household Gini's thus get an error margin of 1.25%, the net household and expenditure Ginis, which need to be converted into gross household Ginis, get an error margin of 3.75%. Finally, the Williamson index and height Gini's are assessed as having a margin of 8.75%. The results are presented in Table 7: the estimated confidence interval (at 95%) declines from around 8% in 1820 to 1.4% in 2000.

For the between country inequality, we follow Bourguignon and Morrisson (2002, 730) and run a Monte Carlo simulation (we experimented with this only with the 2005 benchmark data, but using the 1990 benchmark would give very similar results). We assume 100 countries, where the GDP/cap follows an exponential distribution (our empirical distribution tests showed that in the majority of the cases we cannot reject at 5% that the per capita GDP followed this probability distribution), and the population follows a lognormal distribution (again in most cases log-normality seems a very good approximation for population according to empirical tests [not reported here, but available from the authors]). For each year we use the parameters estimated from the actual data, and carry out 5000 experiments to estimate the mean, the standard error and the confidence interval of the between-country Gini. We follow Bourguignon and Morrisson (2002) in assuming that there is a random (normally distributed) multiplicative measurement error. We apply a mean value of 1 and 0.2 standard deviations for the error. This 0.2 standard deviation is an absolute maximum since it requires more than double the actual standard deviation in the underlying data. This results in a 95% confidence interval with about 30% higher or lower Gini (Table 8). Given the strong increase of the between Gini between 1820 and 2000, chances that the general trend is wrong are quite small.

4. The long-term development of global inequality and poverty

As outlined above, inequality increases between 1820 and 2000 with almost 50%. Most of these changes, however, occurred before 1950, while inequality remained virtually stable afterwards. This pattern, however, is largely driven by between country inequality since, as can be seen in Table 5, within country inequality remained largely constant at .43. This long-run pattern does not obscure, however, that development was episodic in the short run.

Indeed, within country inequality was essentially constant, except for the period between ca. 1950-1980 when it fell substantially below the long-run average (from .44 to .35), followed by an increase in the final decades of the 20th century, which brings within inequality, in 2000, back to the level before the 'egalitarian revolution' of the 20th century. The within country inequality does not contribute a lot to the long run swings in global inequality. Between country inequality, however, grows strongly between 1820 and 1950. With the rise of global inequality between 1820 and 1950, the overlap factor increases, but it then declines between 1950 and 1980, a sign of growing polarization of the income pyramid discussed below (see Figure 2). This is followed by an increase in the overlap factor again between 1980 and 2000. What this suggests is that behind the apparent stability of the global Gini index during the 1950-2000 period, major changes in income distribution occurred, which express themselves (amongst others) in a changing overlap factor.

These changes in the income distribution are also apparent in Figure 2. This Figure charts the different global income distributions in one picture, indicating both the increase in income levels, the growth of the population and the changes in its distribution (all in 2005 dollars) (the comparable figure in 2005 prices is very similar). What is in particular striking, is the change in the structure of the income pyramid through time (see for similar analyses of the more recent period, see Milanovic 2002, Sala-I-Martin 2006). Between 1820 and 1910, the world income distribution is unimodal and basically lognormal, although, looking at the 1910 distribution, an extension of its right ´wing´ can already be noticed. In the next few decades a different distribution emerges with two separate peaks; this is already very clear in 1950 (when the two peaks have almost the same size), and becomes more pronounced in the 1960s and 1970s, when a big gap between rich and poor 'peaks' appears. However, in the 1980s and the 1990s the two modes begin to merge, and in 2000 the distribution has become consistently unimodal again.

One might argue that the switch to a bi-modal distribution is caused by de-globalization after 1914: a lack of trade caused by two world wars, a depression, and a bi-polar world system. This, however, is a topic for further research – here we can only speculate about the fact that this change from a unimodal distribution towards a bi-modal system is accompanied by the decline of inequality within countries (the 'egalitarian revolution' of the 20th century is a typically phenomenon of the developing nation state, which allows itself more degrees of freedom in the de-globalized world of 1914-1960). We can also speculate that after 1980 globalization, the increase of inequality within countries and the decline of inequality between countries were in a similar way closely interrelated processes.

The dataset also makes it possible to study within country inequality of the main regions of the world, in order to see to what extent they were affected by these long-term trends. It is well known that in the post-1950 period there are more or less persistent differences in the level of within-country income inequality in different regions of the world. Latin America and Africa have, on average, relatively high levels of inequality, whereas Western Europe and Asia tend to have lower levels (Deiniger and Squire 1998). These patterns also emerge when we look at the unweighted averages of the ginis of the different countries in the different regions and the world as a whole (Table 9): Latin America and Africa almost always have a higher average Gini than Europe; the Middle East also is often above average, whereas Asia is usually below average.[8] Before 1950 the differences between the continents are relatively small, however, and Western Europe is still among the regions with, on balance, above-average inequality. It only moves to below average after 1945. The industrial revolution therefore emerged in a region with rather high levels of income inequality, but levels of income were also high there, as a result of which the extraction ratio was much lower than elsewhere (Milanovic, Lindert and Williamson 2007). This decline of inequality is even more pronounced in (communist dominated) Eastern Europe, which has by far the lowest Ginis during the 1950-1990 period. The 'egalitarian revolution' of the 20th century is also apparent in North America/Australia, and can even be found in the (unweighted) global averages, which decline between 1929 and 1980 (by about 10%). In all regions we see an increase in inequality in the last decade of the 20th century; it is most striking in post communist Eastern Europe. Before 1950 levels of inequality within these regions are relatively stable, with the most notable exception of Latin America in the 1870-1910 period,

[8] We splitted up the regions according to economic and political characteristics. The first group consists of Western European countries, consisting of all European countries, except the former socialist ones. Eastern Europe and the former USSR consist of all former socialist countries of Eastern Europe and the former USSR. "Asia"consist of all Asian countries, except the Middle East. "Middle East and North Africa" consists of the Middle Eastern countries and Africa above the Sahara. Sub Saharan Africa contains all other African countries. Latin America contains all Latin American (and Caribbean) countries. Finally, Western Offshoots, contains Canada, USA, New Zealand, and Australia.

which according to our estimates witnessed a decline of the Gini coefficient by almost 20% in this period of globalization.

We can also estimate ‘within region’ income inequality of the various parts of the world, which is the product of inequality within the countries of that region and income disparities between those countries (for example: it takes into account that within Western Europe there were large income differences between rich countries such as the UK and the Netherlands, and poor countries such as Portugal or Finland). This addresses the problem that countries form the basic unit of analysis in this kind of research, but that their size varies enormously as well as the problem that income differences across countries may vary widely. Hence, even when average within country inequality is low, actual inequality may be much higher because the income differences across countries are higher. Indeed, income inequality in large countries such as China, the US or India, tends to be higher than that of small, homogenous countries such as Denmark or Belgium, because it also includes the income disparities between the different parts of such a large state.

In table 10 we present estimates of ‘within region’ income inequality of 7 regions, which are, however, still quite different in size (Asia is by far the largest region, with currently 55 percent of the global population). A number of patterns emerge from these estimates. In Europe and the Western Offshoots, regional inequality declines in the long run and moves from the world average to much below that average, but the last two decades of the 20th century this process appears to come to an end. Regional inequality in Asia changes in the opposite direction: it is relatively low during the 19th century, but increases sharply in the 20th century. Increasing ‘within region – between country’ inequality is driving this process – first Japan is the main mover, later followed by other countries which are successfully catching up (whereas large parts of the region remain poor). Regional inequality in Sub-Sahara Africa offers a third pattern: the Gini is very high at the beginning of the period (but the number of observations is quite limited), and continues to be very unequal. The big gap between the unweighted average Gini of Table 9 and the regional inequality Gini of Table 10 implies that between country inequality in Africa is quite large, thanks to some relatively successful economies (South Africa in particular), and many quite unsuccessful ones (with the lowest GDP per capita's in the world). In this comparison, it is not Latin America that comes forward as the most unequal continent (which in other studies usually is the case); between country inequality is that part of the world is rather limited, as a result of which 'within region' inequality is, initially, even smaller than the unweighted average of the country-Gini's. This changes in the course of the 19th century, but still the overall level of inequality in the region remains below that of Africa (and of the world as a whole).

Combining the development of inequality and economic growth, one may estimate the development of the number of people living below a certain poverty line (of one or two dollars, in 1990 and 2005 prices). These estimates are made to sketch the long-term changes in absolute poverty in the world economy (see Table 11). It is important to stress that our world poverty estimates are lower than most other contemporary estimates. This has two reasons. First, our world estimates are based on a population weighted average of all countries in our sample. However, especially some of the poorer regions are underrepresented. This will bias our estimate of the poor downwards by ca. 6% on average using one 1990 GK dollars or around 3% in two 1990 GK dollars. Second, we estimate the number of people with an *income* below the various thresholds, whereas most studies in this field focus on *expenditure* per capita, which is usually lower than income (see for recent surveys Chen and Ravallion 2008 and Deaton 2010). Indeed, Sala-i-Martin (2006), using the same combination of data from surveys and average income from national accounts, found roughly similar levels of inequality as in this paper. Ravallion (2004) has shown that both methods result in roughly similar results provided we accept 2 USD a day as poverty line. Hence, if one wants to compare our estimate to those in the literature, one best use this threshold.

Table 11 presents the estimates for the world as a whole in 1990 and 2005 international dollars. According to the 1990 benchmark estimates, the total number of poor people (below 1 dollar) was more or less stable between 1820 and 1929 (when economic growth was apparently strong enough to compensate for the growth of the total population), increased very rapidly between 1929 and 1950 (from 423 to 649 million), fell sharply after 1950 to its lowest point, 222 million, in 1980, but began to increase again after 1980 (a trend that was only reversed after 1995). A somewhat similar pattern can be found when using 2 dollars per day as the poverty line; using this measure, the number of poor still increases until 1970, declines rapidly between 1970 and 1985, but increases a bit in the next decade. It is striking that the trends in 2005 dollars are basically the same, although the levels differ a bit. This is the result of two opposing tendencies: firstly, prices have on average increased from 1990 to 2005, which has the effect of lowering the number of people below the poverty line (or rather, the poverty line in real terms declines as a result). Secondly, the new 2005 ICP round increases income disparities between rich and poor countries, which has the opposite effect of increasing the number of people below the poverty line (although this is more complex than it seems, as the poverty line is defined by levels of absolute poverty in the poor countries – see the discussion between Chen and Ravallion 2008 and Deaton 2010). The net effect of this is the number of poor according to the 2005 benchmark and in 2005 prices are generally somewhat smaller than according to the 1990 benchmark and in 1990 prices. Our results are, however, much lower than the most recent estimates made by Chen and Ravallion (2008) and also different from those published by B&M, who estimated that the number of people living in extreme poverty remained more or less the same between 1960 and 1992. We on the other hand find a strong decline between 1950 and 1980, followed by relative stability in more recent years.

Table 12 and 13 summarize the estimates of the distribution of the world's poor over different regions. Table 12 shows that poverty is on the decline everywhere, but that the starting points were very different: in Western Europe and the Western Offshoots, in 1820, 'only' one out of four earned less than 1 dollar per day, but this share was three quarter in Africa – other regions were in between. Latin America saw an almost continuous reduction of absolute poverty during the 19th and 20th century (which only started to stagnate after 1980), whereas poverty reduction in Asia only began in earnest after 1950 (but it was very rapid since). The region that had the highest share of poor people in 1820, Sub Sahara Africa, has also in the long run been rather unsuccessful in reducing the number of inhabitants below the poverty line. The result of this is, as Table 13 demonstrated, that in 2000 (according to these estimates) 40-45% of the world's poor (below the 1 dollar threshold) live in Africa, whereas the continent only has 11% of the global population.

5. Conclusion

We have reconstructed a new dataset of estimates of the inequality of the income distribution for a large set of countries for benchmark years starting in 1820 and ending in 2000. This was, in comparison with the estimates produced by Bourguignon and Morrisson (2002), based on the use of new (and old) historical studies of income inequality in different countries, and on different sets of indirect estimates of the development of the Gini index.

From these within country inequality estimates, we aggregated to a World Gini using income differences between countries. We used the new 2005 PPPs of the ICP project, which may give a more accurate picture of disparities in GDP per capita than the previous ICP rounds. Since many estimates use the Maddison (2003) data, we also provided a second set of World Ginis based on these numbers. The combination of these estimates of within and between country inequality have been used to reconstruct the evolution of global inequality between 1820 and 2000.

The long term evolution of global inequality that emerges from this is not very dissimilar from the results presented by B & M. Our estimates show a more or less similar increase during the 1820-1950 period, and stability (instead of a small increase) during the second half of the 20th century. Within country inequality did not change a lot in the very long run, although in many countries inequality tended to decline during the 20th century 'egalitarian revolution', but this was often followed by a rise of inequality after 1980. Between country inequality increased a lot and was the main cause behind the very strong increase in global inequality in these two centuries. This process appears to have come to an end during the second half of the 20th century, however – between 1950 and 1980 there was a high level stagnation of between country inequality, followed by a small decline during the final decades of the century. This decline in between country inequality between ca 1975 and 2000 was being 'undone' however, by the increase of within country inequality in the same period. In other respects this period of globalization also stands out: whereas global inequality did not continue to rise, the absolute number of people below the poverty line of one dollar did not fall anymore after 1980, and even their share in the world population declined only marginally. The absolute poor therefore did not profit much from globalization (those with a slightly higher real income, between 1 and 2 dollars per day, did only marginally better). In the very long-run, however, comparing 1820 with 2000, it looks like the absolute number of people living below the poverty line remained more or less constant.

Our most striking results point to important changes in the structure of global inequality. It was a clear unimodal distribution in the 19th century, but it became increasingly bi-modal during the middle decades of the 20th century, when a clear separation between 'rich' and 'poor' peaks in the global income distribution emerged. This is a striking result, because at the same time, as we saw, the share of the very poor fell rapidly during this period, both in absolute terms and as a share of the world population. Between 1980 and 2000, the shape of the global distribution changed 'suddenly' from a bi-modal to a unimodal distribution, mainly due to the rapid growth in countries such as China, India and Indonesia. Our speculation that these changes in the global income distribution were linked to processes of globalization and de-globalization in the world economy, clearly require further explanation. The globalized world of the (late) nineteenth century produced a unimodal distribution. Processes of de-globalization in the middle decades of the twentieth century had two effects on global inequality: nation states acquired the freedom to build a welfare state that sharply reduced income inequality within countries (in the richer part of the world), but at the same time it seems to have lead to the emergence of a bi-model distribution on a global scale. The dramatic process of globalization of the final decades of the 20th century reversed both changes: it led to a strong increase in within country inequality (bringing it back to its level from before the 'egalitarian revolution' of the twentieth century), and it resulted in the sudden appearance of a unimodal income distribution on a global scale (and a small decline in between country inequality).

Appendix: heights studies used: http://www.wiwi.uni-tuebingen.de/cms/fileadmin/Uploads/Schulung/Schulung5/Joerg/ref_anth.pdf

References

Afriat, Sydney (1967), "The construction of utility functions from expenditure data," *International Economic Review*, 8(1), 67–77.

A'Hearn, B. (2004). A Restricted Maximum Likelihood Estimator for Truncated Height Samples. *Economics and Human Biology* 2, pp. 5-19

Allen, Robert C. (2001).'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War,' *Explorations in Economic History*, Vol. 38, pp 411-447.

Allen, Robert & Jean-Pascal Bassino & Debin Ma & Christine Moll-Murata & Jan Luiten van Zanden, 2010. 'Wages, Prices, and Living Standards in China,1738-1925: in comparison with Europe, Japan, and India,' Economic History Review, forthcoming

Alvaredo, F. and Saez, E. (2009). 'Income and wealth concentration in Spain from a historical and fiscal perspective,'*Journal of the European Economic Association*, 7(5), 1140-1167.

Atkinson, A. B. (2007b). 'Top incomes in the United Kingdom over the twentieth century.' *In Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries* (ed. A. Atkinson and T. Piketty), pp.82-140. Oxford: Oxford University Press.

Atkinson, A. B. and Leigh, A. (2005). 'The distribution of top incomes in New Zealand.'

Atkinson, A. B. and Leigh, A. (2007a). 'The distribution of top incomes in Australia.'

Atkinson, A.B., & Brandolini, A. (2001). Promise and Pitfalls in the Use of 'Secondary' Data Sets: Income Inequality in OECD Countries as a Case Study. *Journal of Economic Literature*, 39(3), 771-799. Australian National University CEPR Discussion Paper 503.

Banerjee, A. and T. Piketty (2005), 'Top Indian Incomes, 1922-2000', *The World Bank Economic Review*, 19, 1-20.

Barro, R. J. (2000), 'Inequality and Growth in a Panel of Countries', *Journal of Economic Growth*, vol. 5, no. 1, March 2000, pp. 5-32.

Bassino, J.P. (2006). Inequality in Japan (1892-1941): Physical Stature, Income, and Health. Economic and *Human Biology* 4, pp. 62-88.

Baten, J. (1999). *Ernährung und wirtschaftliche Entwicklung in Bayern, 1730-1880*. Stuttgart: Steiner.

Baten, J. (2000). "Economic Development and the Distribution of Nutritional Resources in Bavaria, 1797-1839," in *Journal of Income Distribution* 9, pp. 89-106

Baten, J. and U. Fraunholz (2004). Did Partial Globalization Increase Inequality? The Case of the Latin American Periphery, 1950-2000" with Uwe Fraunholz, *CESifo Economic Studies* 50-1 (2004), pp. 45-84.

Baten, J., and Böhm, A. (2009). "Trends of Children's Height and Parental Unemployment: A Large-Scale Anthropometric Study on Eastern Germany, 1994-2006.", *German Economic Review* (forthcoming).

Benabou, R. (1996), 'Inequality and Growth', in: B. S. Bernanke and J. J. Rotemberg (eds), *NBER Macroeconomics Annual* 1996, Cambridge, MA: MIT Press, pp. 11–74.

Bergson, Abram. (1984). Income inequality under Soviet socialism. *Journal of Economic Literature,* Vol. 22, no. 3. September. 1052-1099.

Bertola, Luis, Cecilia Castelnovo, Javier Rodriguez, Henry Willebald (2009). 'Income distribution in the Latin American Southern Cone during the first globalization boom and beyond' International Journal of Comparative Sociology (forthcoming)

Bigsten, A. (1985). *Income Distribution and Growth in a Dual Economy. PhD thesis, Gothenburg University, Department of Economics.*

Bourguignon, F., Morrisson, C.,(2002). Inequality among world citizens: 1890-1992, *American Economic Review* 92 (4), 727-744, September.

Brandt, L. & Sands, B. (1992) "Land Concentration and Income Distribution in Republican China,' in: *Chinese History in Economic Perspective*, eds. Th. Rawki and L. Lee, California University Press, Berkeley: 179-206.

Broadberry, S. (2003) "Relative per capita Income Levels in the United Kingdom and the United States since 1870: Reconciling Time Series Projections and Direct Benchmark Estimates", *Journal of Economic History*, 63 (2003): 852-863.

Chen, Shoalma and Martin Ravallion (2008) The developing world is poorer than we thought, but no less successful in the fight against poverty', Policy Research Working Paper 4703, World Bank.
Chapman, Agatha, L. Wages and Salaries in the United Kingdom 1920–1938. Cambridge: Cambridge University Press, 1953
Deaton, A. (2001). Relative Deprivation, Inequality and Mortality. *NBER Working Paper 8099.*
Deaton, A. and A. Heston (2008) 'Understanding PPPs and PPP-Based National Accounts'. *NBER working paper 14499*.
Deaton, A. (2010) 'Price indexes, inequality, and the measurement of world poverty', presidential address, American Economic Association, Atlanta January 2010.
Deininger, K. and Squire, L. (1996), 'A new dataset measuring income inequality', *The World Bank Economic Review*, 10, 565-591.
Deininger, K. and Squire, L. (1998), 'New Ways of Looking at Old Issues: Inequality and Growth', *Journal of Development Economics*, December 1998, 57(2), pp. 259 – 87
Dell, F. (2007). 'Top incomes in Germany throughout the twentieth century: 1891–1998.' In *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries* (ed. A. Atkinson and T. Piketty), pp.365-425. Oxford: Oxford University Press.
Dell, F., Piketty T. and Saez, E. (2007). 'Income and wealth concentration in Switzerland over the 20th century.' In *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries* (ed. A. Atkinson and T. Piketty), pp.472-500. Oxford: Oxford University Press.
Dowrick, Steve, and John Quiggin, 1994, "International comparisons of living standards and tastes: a revealed preference approach," *American Economic Review*, 84:1, 332–41.
Feinstein, Charles H. and Mark Thomas, 'A Plea for Errors,' *Discussion Papers in Economic and Social History*, Number 41, University of Oxford 2001.
François, J.F., and H. Rojas-Romagosa (2005), "The Construction and Interpretation of Combined Cross Section and Time-Series Inequality Datasets," *Worl d Bank Policy Research Working Paper* 3748.
Guntupalli, A.M. and Baten, J. (2006). "The Development and Inequality of Heights in North, West and East India, 1915-44", *Explorations in Economic History* 43, iss. 4, pp. 578-608**.**
Jacobs, J., Katzur, T., Tassenaar, V. (2008). On Estimators for Truncated Height Samples. Economics and Human Biology 6-1, pp. 43-56.
Jones, C.I., (1997). On the evolution of the world income distribution, *Journal of Economic Perspectives* 11 (3), 19-36, Summer.
Komlos, J. & Kriwy, P. (2003). The Biological Standard of Living in the Two Germanies. *German Economic Review*, 4(4), 459-73.
Komlos, J. (1985). Stature and Nutrition in the Habsburg Monarchy: The Standard of Living and Economic Development. *American Historical Review*, 90, 1149-1161.
Latham and H. Kawakatsu (eds.), *Asia Pacific Dynamism 1500-2000* (London: Routledge): 13-45.
Leigh, A. (2007) 'How closely do top income shares track other measures of inequality', *The Economic Journal*, 117 (524), F589-F603.
Leigh, A. and Van der Eng P. (2010) 'Top Incomes in Indonesia, 1920-2004', in: *Top incomes over the twentieth century: Volume II, A global perspective*, eds. Atkinson, A. B, and Piketty, T., Oxford University Press, Oxford: 171-219.
López, J.H., Servén, L., 2006. *A normal relationship? Poverty, growth, and inequality*. Macmillan Reference; New York : Stockton Press, 1998.
Maddison, A. (2001). *The world economy: a millennial perspective*. OECD, Paris.
Maddison, A. (2003). *The world economy: historical statistics.* OECD, Paris
Milanovic, B., (2002). True world income distribution, 1988 and 1993: First calculation based on household surveys alone, *Economic Journal* 112 (476), 51-92, January.
Milanovic, Branko (2007) *World Apart. Measuring International and Global Inequality*. Princeton.
Milanovic, Branko (2009) Global Inequality recalculated: the effect of the new 2005 PPP estimates on global inequality. Policy Research Working Papers 5061, World Bank.
Milanovic, Branko, Peter Lindert and Jeffrey Williamson (2007) Measuring Ancient Inequality. MPRA working paper No. 5388, http://mpra.ub.uni-muenchen.de/5388/1/MPRA_paper_5388.pdf
Mironov, B. (2004). Prices and Wages in St. Petersburg for Three Centuries (1703-2003). *Towards a Global History of Prices and Wages,* Utrecht 19-21 August 2004.
Mitchell, B. R. (2003a). *International Historical Statistics: Africa, Asia and Oceania, 1750-2000* (Basingstoke and New York: Palgrave Macmillan, 4th edn. 2003.
Mitchell, B.R. (1998). *International historical statistics: the Americas, 1750-1993***,** London: Macmillan
Mitchell, B.R. (1998b). *International historical statistics: Africa, Asia & Oceania, 1750-1993,* London: Macmillan Reference; New York : Stockton Press, 1998.
Mitchell, B.R. (1998c). *International historical statistics: Europe, 1750-1993*, London :

Moradi, A. and Baten, J. (2005) “Inequality in Sub-Saharan Africa 1950-80: New Estimates and New Results, ” *World Development* Volume 33-8 (2005), pp. 1233-1265.
Moriguchi, C. and Saez, E. (2006). ‘The evolution of income concentration in Japan, 1885-2002: evidence from income tax statistics,’ National Bureau of Economic Research Working Paper 12558, NBER, Cambridge, MA.
Nolan, B. (2007). ‘Long-term trends in top income shares in Ireland.’ In *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries* (ed. A. Atkinson and T. Piketty), pp.501-530. Oxford: Oxford University Press.
Persson, T. and Tabellini, G. (1994), ‘Is Inequality Harmful for Growth?’, *American Economic Review*, 84-3, pp. 600–21.
Piketty, T. (2007). ‘Income, wage and wealth inequality in France, 1901-1998.’ In Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries (ed. A. Atkinson and T. Piketty), pp.43-81. Oxford: Oxford University Press.
Piketty, T. and Saez, E. (2006b). ‘Income inequality in the United States.’ Tables and Figures updated to 2004 in Excel format, http://emlab.berkeley.edu/users/saez/ (downloaded 6 December 2006).
Pradhan, M., Sahn, D.E., & Younger, S.D. (2003). Decomposing World Health Inequality. *Journal of Health Economics*, 22(2), 271-293.
Prados de la Escosura, L. (2008), ‘Inequality, Poverty and the Kuznets Curve in Spain, 1850-2000. *European Review of Economic History* 12, pp. 287-324
Prados de la Escosura, Leandro, (2000). "International Comparisons of Real Product, 1820-1990: An Alternative Data Set," *Explorations in Economic History*, vol. 37(1), pages 1-41, January. Reference; New York : Stockton Press.
Ravallion, M. (2004) ‘Pessimistic on Poverty?’, *The Economist*, 371, April 10.
Ravallion, Martin (2010) Price Levels and Economic Growth. Making Sense of the PPP Changes between ICP Rounds. Policy Research Working Paper, The World Bank, 5229.
Roine, J. and Waldenström, D. (2006). ‘Top incomes in Sweden over the twentieth century.’ Research Institute of Industrial Economics Working Paper 667, Stockholm, Sweden.
Rossi, N., G. Toniolo, G. Vecchi, “Is the Kuznets curve still alive ? Evidence from Italian household budgets, 1881-1961”, *The journal of economic history,* 4, 2001.
Saez, E. and Veall, M. (2005). ‘The evolution of high incomes in Northern America: lessons from Canadian evidence.’ *American Economic Review*, vol. 95(3), (June), pp. 831-849.
Sala-i-Martin, Xavier (2006). ‘The World Distribution of Income: Falling Povery and … Convergence, Period.’ *Quarterly Journal* ***of*** *Economics*, May 2006, v. 121, iss. 2, pp. 351-97
Salverda, W. and Atkinson, A. B. (2007). ‘Top incomes in the Netherlands over the twentieth century.’ In Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries (ed. A. Atkinson and T. Piketty), pp.426-472. Oxford: Oxford University Press.
Schmitt, L.H. & Harrison, G.A. (1988). Patterns in the Within-Population Variability of Stature and Weight. *Annals of Human Biology*, 15(5), 353-364.
Solt, Frederick (2009), “Standardizing the World Income Inequality Database”, *Social Science Quarterly*, 90 (2), 231-242.
Soltow, L. (1998), “The Measures of Inequality”, in: L. Soltow and J.L. van Zanden (eds.), *Income & Wealth Inequality in the Netherlands 16th-20th Century*, Het Spinhuis: Amsterdam, 7-22.
Soltow, Lee and Jan Luiten van Zanden (1998) *Income and Wealth Inequality in the Netherlands 1500-1990.* Het Spinhuis Amsterdam
Steckel, R. (1995). Stature and the Standard of Living. *Journal of Economic Literature,* 33(4), 1903–1940.
Sunder, M. (2003). The Making of Giants in a Welfare State: The Norwegian Experience in the 20th Century. *Economics & Human Biology*, 1(2), 267-276.
Terreblanche, S. & De Villiers, R. (2002). *A History of Inequality in South Africa, 1652-2002*. Pietermaritzburg : University of Natal Press.
Van Leeuwen, B. & Földvári, P. (2009), “The Development of inequality and poverty in Indonesia, 1932-1999”, Unpublished paper 2009.
Williamson Jeffrey G. (1998). “Globalization and the Labor Market: Using History to Inform Policy ” pp. 103-193 in P. Aghion and J. G. Williamson, eds.Growth, Inequality and Globalization. Cambridge UP.
Williamson, J. (1999). Real Wages, Inequality, and Globalization in Latin America Before 1940. *Revista de Historia Economica*, 17 (special number), 101-142.
Williamson, J.G. (2000a), ‘Globalization, factor prices and living standards in Asia before 1940’, in A.J.H. Latham and H. Kawakatsu, eds., Asia Pacific Dynamism 1550-2000, London: Routledge, 13-45.
Williamson, J. (2000b). Real Wages and Factor Prices Around the Mediterranean 1500-1940,in S. Pamuk and J.G. Williamson (eds.) *The Mediterranean Response to Globalization Before 1950* (London: Routledge) : 45-75.

Williamson, J. G. and P. H. Lindert (1980), *American Inequality: A Macroeconomic History.* (New York: Academic Press).
World Bank (2008), *Global purchasing power parities and real expenditures: 2005 international comparison program*, Washington, DC.World Bank Policy Research Working Paper 3814.
World Income Inequality Database V2.0c May 2008 (http://www.wider.unu.edu/research/Database/en_GB/database/)

Table 1. The relationship between gross and net household Gini

	before 1980	after 1980
constant	9.420 (1.55)	19.62 (1.66)
Net household income Gini	0.788 (4.45)	0.367 (0.91)
Net household income Gini x time trend	0.002 (7.41)	0.003 (0.50)
time trend	-0.073 (-5.16)	-0.059 (-0.26)
R^2	0.730	0.462
N	82	114

Notes: The dependent variable is the gross household Gini coefficient. LSDV fixed-effect panel specification, country dummies are not reported. Robust t-statistics in parentheses.

Table 2. How to estimate Gini coefficients based on the Williamson method of wage to GDP ratios

	Coefficient
Constant	3.657 (6.11)
$\ln\left(y_{it}/w_{it}^{un}\right)$	0.212 (2.25)
$\ln y_{it}$	-0.158 (-3.08)
R^2	0.599

LSDV panel regression, N=136, country dummies are not reported, robust t-statistics in parentheses

Table 3. Relationship between income (gini) and height inequality (CV)

Gini-coefficient of income	(1)	(2)	(3)	(4)
Constant	-23.429 (-0.80)	-65.912 (-2.06)	19.235 (0.23)	-33.557 (-0.70)
CV	13.182 (1.72)	20.932 (2.87)	8.988 (0.42)	20.547 (1.67)
Coverage of female population (in %)	0.016 (0.20)		0.024 (0.13)	
Age group 20-24 (1=yes, 0=no)	-2.073 (-0.85)			
Age group 45-49 (1=yes, 0=no)	-2.343 (-0.60)			
Gabon		19.582 (4.22)		21.167 (3.01)
Country fixed-effects [p-value]	[0.000]		[0.387]	
Fixed effects for population coverage and income definition [p-value]	[0.000]	[0.000]	[0.810]	[0.026]
Fixed effects for primary source [p-value]	[0.000]	[0.052]		
Weighted by	share of female population		multiple country-periods	
R^2-adj.	0.812	0.521	0.324	0.436
N	78	78	29	29
Degrees of freedom	42	58	6	19

Source: Moradi and Baten (2005). Notes: Gini coefficients which were not based on a national coverage were excluded; t-values in circular parentheses. Number of countries: 14. The reference category represents a gini based on gross income, which covers the total population and persons as reference units. When dummies for countries and the source of gini are included, the reference category additionally represents Kenya and Bigsten (1986). The population coverage controlled for refers to households, economically active population, income recipients and taxpayers, with the income definitions referring to expenditure, net income and income not nearer specified. In cases where two DHS-surveys offer information on the same birth cohort, we took the average weighted by the female population they cover. The gini coefficients were derived from twelve primary sources listed in Deininger and Squire (1996). Coverage/Age: Additionally, we would have expected a negative coefficient for the percentage of the female population measured, correcting for the somewhat higher CV when based on more women. Obviously, however, the impact is almost zero. Similarly, age effects have the expected negative sign but do not introduce a significant bias.

Table 4. Overview of the sources of the dataset of income inequality, 1820-2000

	1	2	3	4	5	6	7
year	All	WIID	'New' ginis	GDP/wage ratio	Heights	Both 4&5 (50/50)	Interpolations
1820	39	0	6	7	19	5	2
1850	42	0	2	9	22	8	1
1870	54	0	9	5	28	11	1
1890	59	0	8	5	33	12	1
1910	71	1	11	7	42	9	1
1929	73	2	13	9	38	11	0
1950	83	13	10	7	44	9	0
1960	89	52	4	2	30	1	0
1970	95	60	2	2	30	1	0
1975	70	50	1	2	16	1	0
1980	83	71	0	0	12	0	0
1985	68	67	1	0	0	0	0
1990	99	98	1	0	0	0	0
1995	92	91	1	0	0	0	0
2000	61	61	0	0	0	0	0
Total	1078	566	69	55	314	68	6

Table 5A. Within country and between countries inequality, 1820-2000 (1990 benchmark)

	Within country inequality	Between country inequality	Sum	Actual world gini	Overlap factor
1820	**0.43**	**0.16**	0.59	0.48	-0.11
1850	**0.43**	**0.24**	0.67	0.50	-0.17
1870	**0.41**	**0.32**	0.73	0.53	-0.21
1890	**0.39**	**0.38**	0.77	0.55	-0.23
1910	**0.41**	**0.44**	0.85	0.59	-0.26
1929	**0.44**	**0.49**	0.92	0.63	-0.29
1950	**0.44**	**0.58**	1.02	0.65	-0.37
1960	**0.38**	**0.54**	0.92	0.64	-0.28
1970	**0.37**	**0.56**	0.93	0.65	-0.28
1975	**0.37**	**0.58**	0.96	0.68	-0.28
1980	**0.35**	**0.56**	0.91	0.65	-0.27
1985	**0.37**	**0.52**	0.89	0.63	-0.26
1990	**0.38**	**0.53**	0.91	0.64	-0.27
1995	**0.42**	**0.52**	0.94	0.65	-0.29
2000	**0.45**	**0.51**	0.96	0.64	-0.32

Table 5B Within country and between countries inequality, 1820-2000 (2005 benchmark)

	within country inequality	between country inequality	sum	actual world gini	overlap factor
1820	**0.43**	**0.29**	0.72	0.54	-0.18
1850	**0.43**	**0.24**	0.67	0.56	-0.10
1870	**0.41**	**0.43**	0.85	0.59	-0.25
1890	**0.39**	**0.48**	0.87	0.61	-0.26
1910	**0.41**	**0.51**	0.92	0.64	-0.28
1929	**0.43**	**0.55**	0.98	0.67	-0.31
1950	**0.44**	**0.59**	1.03	0.69	-0.34
1960	**0.38**	**0.58**	0.96	0.68	-0.29
1970	**0.37**	**0.60**	0.96	0.68	-0.28
1975	**0.37**	**0.63**	1.00	0.72	-0.28
1980	**0.35**	**0.60**	0.95	0.68	-0.27
1985	**0.37**	**0.60**	0.96	0.68	-0.29
1990	**0.39**	**0.60**	0.99	0.69	-0.30
1995	**0.43**	**0.59**	1.02	0.69	-0.33
2000	**0.45**	**0.58**	1.03	0.72	-0.31

Table 6. Estimates of Global Income Inequality, and the coverage of the dataset, 1820-2000 (1990 benchmark)

	World GINIs (2005)	(1990)	Population covered (million)	Share of global population	Average income covered population (1990)	Average income world (1990)	Ratio coverage/all
1820	**0.54**	0.48	922	0,89	689	667	1,03
1850	**0.56**	0.50	1031	0,87	802	791	1,01
1870	**0.59**	0.53	1137	0,89	913	873	1,05
1890	**0.61**	0.54	1286	0,88	1.142	1.133	1,01
1910	**0.64**	0.59	1570	0,90	1.504	1.465	1,03
1929	**0.67**	0.63	1844	0,90	1.861	1.784	1,04
1950	**0.69**	0.66	2414	0,96	2.223	2.113	1,05
1960	**0.68**	0.64	2816	0,93	2.889	2.775	1,04
1970	**0.68**	0.65	3480	0,94	3.850	3.736	1,03
1975	**0.72**	0.68	3230	0,79	4.210	4.095	1,03
1980	**0.68**	0.65	4028	0,91	4.762	4.521	1,05
1985	**0.68**	0.64	4142	0,86	5.266	4.763	1,11
1990	**0.69**	0.64	4952	0,94	5.461	5.162	1,06
1995	**0.69**	0.65	5099	0,90	5.643	5.452	1,03
2000	**0.72**	0.69	5131	0,84	6.578	6.029	1,09

Table 7. Error margins of within-country inequality

	within inequality (global average)	.+/- 95% Confidence interval
1820	0.43	0.027
1850	0.43	0.035
1870	0.41	0.027
1890	0.39	0.023
1910	0.41	0.024
1929	0.43	0.023
1950	0.44	0.011
1960	0.38	0.010
1970	0.37	0.004
1975	0.37	0.004
1980	0.35	0.003
1985	0.37	0.002
1990	0.39	0.004
1995	0.43	0.005
2000	0.45	0.006

Table 8. Error margins of between-country inequality

	Between inequality (2005 benchmark)	.+/- 95% Confidence interval
1820	0.29	0.037
1850	0.24	0.042
1870	0.43	0.049
1890	0.48	0.051
1910	0.51	0.063
1929	0.55	0.068
1950	0.59	0.074
1960	0.58	0.077
1970	0.60	0.080
1975	0.63	0.090
1980	0.60	0.083
1985	0.60	0.070
1990	0.60	0.086
1995	0.59	0.089
2000	0.58	0.081

Table 9 Unweighted averages of the Gini coefficients by region and period, 1820-2000

	Western Europe	Eastern Europe	Asia	Middle East	Sub-Sahara-Africa	Latin America	Western Offshoots	World
	Gini							
1820	49.7	43.4	45.2	41.7	48.5	65.5	45.6	*49.5*
1850	46.2	43.5	39.2	52.7	63.0	50.8	45.4	*45.4*
1870	47.9	41.8	40.8	50.4	48.3	53.2	44.0	*45.6*
1890	42.8	39.2	40.7	42.9	40.5	47.9	43.8	*41.9*
1910	44.6	38.9	42.4	45.0	43.4	44.5	42.2	*42.7*
1929	47.0	39.6	41.4	44.9	45.0	50.2	44.4	*44.4*
1950	39.8	37.7	43.1	45.2	48.2	47.4	37.0	*43.9*
1960	40.7	33.4	42.6	49.8	49.2	48.8	34.6	*44.1*
1970	37.6	33.4	39.3	48.4	47.7	49.4	35.9	*43.0*
1980	35.5	27.9	39.1	42.8	47.1	46.4	37.4	*40.9*
1990	35.1	27.8	40.4	44.1	45.7	49.6	38.3	*39.7*
2000	37.0	37.0	44.5	47.3	47.6	51.8	41.6	*42.8*
Idem, as percentage of world average								
1820	100	88	91	84	98	132	92	100
1850	102	96	86	116	139	112	100	100
1870	105	92	90	111	106	117	96	100
1890	102	94	97	102	97	114	104	100
1910	104	91	99	105	102	104	99	100
1929	106	89	93	101	101	113	100	100
1950	91	86	98	103	110	108	84	100
1960	92	76	97	113	112	111	78	100
1970	87	78	91	113	111	115	83	100
1980	87	68	95	104	115	113	91	100
1990	88	70	102	111	115	125	97	100
2000	86	86	104	111	111	121	97	100
Sample size								
1820	14	5	5	2	8	5	2	41
1850	14	7	12	2	2	5	3	45
1870	15	12	15	4	8	6	3	63
1890	15	16	14	6	9	8	3	71
1910	14	18	12	5	26	10	4	89
1929	15	16	13	4	26	10	4	88
1950	16	12	14	3	29	14	4	92
1960	16	12	15	4	27	17	4	95
1970	15	11	17	4	29	20	5	101
1980	16	7	15	5	17	20	5	85
1990	17	23	17	7	21	19	4	108
2000	11	17	13	4	8	10	4	67

Table 10 Income inequality of various world regions, 1820-2000

	Western Europe	Eastern Europe	Asia	Middle East & North Africa	Sub-Sahara Africa	Latin America	Western Offshoots	World
	Gini							
1820	53.7	53.0	40.7	52.2	78.7	59.8	53.2	*53.8*
1850	48.6	52.3	43.0	50.1	67.5	46.5	47.7	*56.4*
1870	51.8	48.3	39.6	52.0	52.6	51.1	46.9	*59.2*
1890	47.0	47.1	39.5	46.9	49.0	48.8	49.9	*60.7*
1910	48.5	46.8	43.9	64.2	57.7	53.0	48.0	*64.2*
1929	50.1	40.7	50.5	50.5	63.6	55.5	52.9	*67.3*
1950	46.3	35.4	57.3	48.7	66.7	50.1	38.9	*68.9*
1960	43.2	30.2	54.6	54.6	65.9	56.0	37.2	*67.6*
1970	39.2	25.7	64.0	52.3	63.6	56.5	34.9	*68.4*
1980	36.7	25.9	64.7	51.4	63.8	54.2	35.5	*68.4*
1990	38.0	28.2	64.2	53.0	62.8	54.5	37.8	*68.5*
2000	39.3	39.8	62.8	54.3	64.6	55.0	42.1	*72.2*
Idem, as percentage of world average								
1820	100	98	76	97	146	111	99	100
1850	86	93	76	89	120	82	85	100
1870	88	82	67	88	89	86	79	100
1890	77	78	65	77	81	80	82	100
1910	76	73	68	100	90	83	75	100
1929	74	60	75	75	95	83	79	100
1950	67	51	83	71	97	73	56	100
1960	64	45	81	81	97	83	55	100
1970	57	38	94	77	93	83	51	100
1980	54	38	95	75	93	79	52	100
1990	55	41	94	77	92	80	55	100
2000	54	55	87	75	89	76	58	100

Table 11A. Estimates of number of people earning less than poverty line 1 or 2 USD dollars per day (in 1990 international dollars, and in millions)

	1 USD day		2 USD day	
	no persons	share of world population	no persons	share of world population
1820	367	**0,40**	674	**0,73**
1850	370	**0,36**	694	**0,67**
1870	383	**0,34**	748	**0,66**
1890	346	**0,27**	762	**0,59**
1910	360	**0,23**	802	**0,51**
1929	423	**0,23**	880	**0,48**
1950	649	**0,27**	1099	**0,46**
1960	442	**0,16**	1121	**0,40**
1970	377	**0,11**	1177	**0,34**
1975	320	**0,10**	1078	**0,33**
1980	222	**0,06**	958	**0,24**
1985	230	**0,06**	762	**0,18**
1990	247	**0,05**	835	**0,17**
1995	326	**0,06**	901	**0,18**
2000	235	**0,05**	696	**0,14**

Table 11B. Estimates of number of people earning less than poverty line of 1 or 2 USD dollars per day (in 2005 dollars, and in millions)

	1 USD day		2 USD day	
	no persons	share of world population	no persons	share of world population
1820	314	**0.34**	605	**0.66**
1850	331	**0.31**	643	**0.61**
1870	314	**0.28**	645	**0.57**
1890	303	**0.22**	694	**0.51**
1910	331	**0.20**	728	**0.45**
1929	386	**0.20**	797	**0.42**
1950	595	**0.26**	992	**0.43**
1960	387	**0.14**	1,038	**0.36**
1970	317	**0.09**	1,073	**0.31**
1975	263	**0.08**	991	**0.31**
1980	174	**0.04**	867	**0.22**
1985	190	**0.05**	695	**0.17**
1990	180	**0.04**	720	**0.15**
1995	255	**0.05**	774	**0.15**
2000	220	**0.04**	672	**0.13**

Table 12 Poverty levels in the regions of the world: share of the regional population below poverty line of 1 and 2 dollars (1990 prices)

% poor (1 USD/day by region)

	Western Europe	Eastern Europe & USSR	Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	26.3%	43.8%	75.6%	51.1%	40.7%	49.3%	25.6%	39.9%
1850	13.4%	37.5%	70.3%	37.9%	41.8%	50.6%	10.1%	36.3%
1870	11.8%	27.6%	55.8%	40.7%	41.6%	41.6%	4.7%	33.7%
1890	6.4%	20.3%	43.6%	24.1%	35.7%	28.4%	3.4%	27.2%
1910	4.2%	13.0%	48.0%	13.1%	33.1%	23.7%	0.9%	23.7%
1929	3.0%	6.2%	48.0%	16.0%	32.6%	25.0%	1.1%	22.9%
1950	1.2%	0.4%	44.9%	7.4%	45.0%	17.1%	0.0%	28.1%
1960	0.2%	0.1%	39.3%	9.8%	22.2%	16.2%	0.0%	15.7%
1970	0.0%	0.0%	27.3%	6.7%	14.6%	9.1%	0.0%	10.8%
1980	0.0%	0.0%	20.6%	2.5%	7.0%	4.7%	0.0%	5.5%
1990	0.0%	0.0%	23.2%	3.3%	5.7%	3.8%	0.0%	5.1%
2000	0.0%	0.2%	23.9%	3.1%	5.4%	3.7%	0.0%	5.4%

% poor (2 USD/day by region)

	Western Europe	Eastern Europe & USSR	Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	52.5%	70.4%	100.0%	74.1%	76.8%	79.7%	51.3%	73.1%
1850	36.1%	64.6%	86.2%	69.4%	76.6%	78.6%	30.9%	68.0%
1870	31.6%	57.7%	81.0%	68.6%	79.0%	70.0%	18.8%	65.8%
1890	19.0%	47.6%	74.5%	54.1%	76.4%	60.2%	13.4%	59.5%
1910	14.0%	33.9%	74.7%	43.5%	70.4%	51.9%	5.4%	51.9%
1929	10.2%	25.7%	74.1%	37.9%	66.2%	52.1%	5.1%	47.9%
1950	6.3%	4.4%	69.9%	24.0%	72.6%	44.3%	0.1%	47.3%
1960	1.4%	0.7%	64.7%	23.8%	60.0%	41.0%	0.0%	39.8%
1970	0.1%	0.1%	54.7%	18.0%	50.0%	28.3%	0.0%	33.8%
1980	0.0%	0.0%	45.4%	9.2%	34.7%	16.6%	0.0%	23.8%
1990	0.1%	0.0%	49.7%	10.7%	22.1%	14.0%	0.0%	17.1%
2000	0.1%	1.9%	47.7%	9.1%	17.7%	12.4%	0.0%	15.3%

Table 13 Distribution of the world's poor over different regions (poverty lines 1 and 2 dollar, 1990 prices)

1 dollar poverty line

	Western Europe	Eastern Europe & USSR	Sub-Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	8.1%	9.2%	11.5%	2.5%	64.2%	3.8%	0.7%	100.0%
1850	5.0%	9.9%	11.3%	2.7%	66.3%	4.3%	0.6%	100.0%
1870	5.0%	8.8%	9.7%	3.7%	68.5%	4.0%	0.5%	100.0%
1890	3.3%	8.6%	8.5%	3.1%	72.4%	3.5%	0.6%	100.0%
1910	2.5%	7.2%	11.7%	2.4%	72.8%	3.3%	0.2%	100.0%
1929	1.7%	3.3%	13.6%	3.5%	73.5%	4.0%	0.3%	100.0%
1950	0.5%	0.1%	12.1%	1.7%	83.3%	2.3%	0.0%	100.0%
1960	0.1%	0.0%	19.3%	4.3%	72.3%	4.0%	0.0%	100.0%
1970	0.0%	0.0%	20.8%	4.7%	71.0%	3.5%	0.0%	100.0%
1980	0.0%	0.0%	30.5%	3.3%	62.6%	3.6%	0.0%	100.0%
1990	0.0%	0.0%	39.5%	4.6%	52.4%	3.4%	0.0%	100.0%
2000	0.0%	0.2%	43.9%	4.3%	48.2%	3.4%	0.0%	100.0%
share world population in 2000	6.5%	6.7%	11.4%	8.6%	55.4%	5.8%	5.5%	100.0%

2 dollar poverty line

	Western Europe	Eastern Europe & USSR	Sub-Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	9.0%	8.3%	8.6%	2.1%	67.9%	3.4%	0.7%	100.0%
1850	7.5%	9.5%	7.7%	2.7%	67.8%	3.7%	1.0%	100.0%
1870	6.9%	9.6%	7.4%	3.2%	68.3%	3.5%	1.0%	100.0%
1890	4.6%	9.3%	6.7%	3.2%	71.6%	3.4%	1.1%	100.0%
1910	3.9%	8.6%	8.4%	3.6%	71.5%	3.3%	0.6%	100.0%
1929	2.8%	6.6%	10.1%	4.0%	71.8%	4.0%	0.7%	100.0%
1950	1.6%	1.0%	11.2%	3.3%	79.5%	3.5%	0.0%	100.0%
1960	0.4%	0.2%	12.7%	4.2%	78.4%	4.1%	0.0%	100.0%
1970	0.0%	0.0%	13.5%	4.1%	78.8%	3.5%	0.0%	100.0%
1980	0.0%	0.0%	16.8%	3.0%	77.0%	3.2%	0.0%	100.0%
1990	0.0%	0.0%	26.8%	4.7%	64.4%	4.0%	0.0%	100.0%
2000	0.0%	0.8%	32.3%	4.6%	58.0%	4.3%	0.0%	100.0%
share world population in 2000	6.5%	6.7%	11.4%	8.6%	55.4%	5.8%	5.5%	100.0%

Table 14. Poverty levels in the regions of the world: share of the regional population below poverty line of 1 and 2 dollars (2005 prices)

% poor (1 USD/day by region)

	Western Europe	Eastern Europe & USSR	Sub Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	13.1%	21.1%	67.8%	32.9%	39.4%	30.4%	14.4%	34.4%
1850	5.2%	15.6%	67.1%	19.8%	40.1%	32.4%	4.1%	31.2%
1870	4.7%	9.1%	48.5%	22.9%	38.7%	28.6%	1.5%	27.6%
1890	2.6%	6.0%	29.5%	10.9%	33.2%	19.1%	1.2%	22.4%
1910	1.6%	3.3%	37.9%	5.5%	31.5%	20.4%	0.3%	20.4%
1929	1.1%	0.7%	37.2%	7.6%	31.4%	13.9%	0.4%	20.1%
1950	0.3%	0.0%	35.9%	2.6%	42.8%	8.1%	0.0%	25.7%
1960	0.0%	0.0%	30.7%	4.8%	20.4%	8.2%	0.0%	13.6%
1970	0.0%	0.0%	19.4%	3.0%	13.3%	4.3%	0.0%	9.1%
1980	0.0%	0.0%	13.3%	1.0%	6.0%	2.0%	0.0%	4.3%
1990	0.0%	0.0%	13.8%	1.4%	4.6%	2.5%	0.0%	3.7%
2000	0.0%	0.0%	14.6%	1.4%	4.6%	1.8%	0.0%	4.3%

% poor (2 USD/day by region)

	Western Europe	Eastern Europe & USSR	Sub Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	31.8%	42.9%	95.4%	56.3%	75.7%	62.6%	35.0%	66.3%
1850	17.5%	37.1%	83.9%	45.3%	75.0%	61.3%	16.6%	60.6%
1870	15.4%	28.4%	75.8%	48.7%	76.1%	56.2%	8.6%	56.7%
1890	8.5%	20.8%	58.8%	32.4%	73.5%	45.9%	6.2%	51.2%
1910	5.9%	12.5%	63.1%	20.5%	67.9%	44.7%	2.0%	44.7%
1929	4.2%	5.9%	63.7%	22.2%	63.7%	34.8%	2.1%	41.5%
1950	1.8%	0.7%	60.0%	11.5%	69.5%	28.3%	0.0%	42.9%
1960	0.3%	0.2%	54.6%	13.7%	57.5%	26.7%	0.0%	36.5%
1970	0.0%	0.0%	42.6%	9.7%	47.9%	16.9%	0.0%	30.8%
1980	0.0%	0.0%	32.6%	4.3%	33.1%	9.0%	0.0%	21.5%
1990	0.0%	0.0%	36.0%	5.3%	20.5%	10.5%	0.0%	14.7%
2000	0.0%	0.1%	35.5%	4.7%	16.4%	7.3%	0.0%	13.3%

Table 15 Distribution of the world's poor over different regions (poverty lines 1 and 2 dollar, 2000 prices)

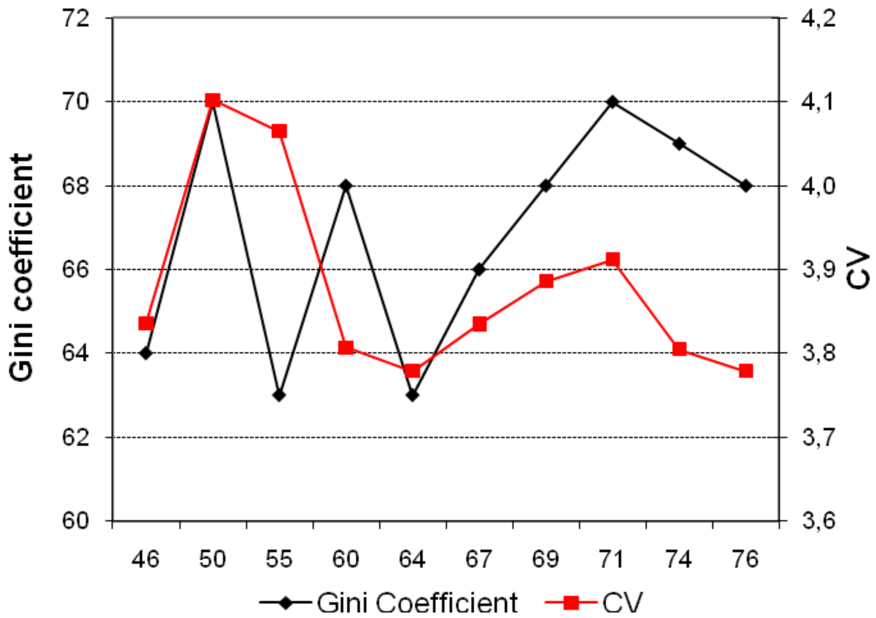
share in world poor (1 2005 dollars/day)

	Western Europe	Eastern Europe & USSR	Sub Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World	world poor (*1000)
1820	4.7%	5.2%	12.1%	1.9%	72.9%	2.8%	0.4%	100.0%	358,279
1850	2.3%	4.9%	12.7%	1.7%	75.0%	3.2%	0.3%	100.0%	368,435
1870	2.4%	3.5%	10.3%	2.5%	77.7%	3.3%	0.2%	100.0%	351,614
1890	1.7%	3.1%	7.1%	1.8%	83.2%	2.9%	0.3%	100.0%	327,796
1910	1.1%	2.1%	10.9%	1.2%	81.4%	3.3%	0.1%	100.0%	353,975
1929	0.7%	0.4%	12.2%	2.0%	82.0%	2.6%	0.1%	100.0%	413,157
1950	0.1%	0.0%	10.7%	0.7%	87.3%	1.2%	0.0%	100.0%	649,814
1960	0.0%	0.0%	17.6%	2.5%	77.5%	2.4%	0.0%	100.0%	413,277
1970	0.0%	0.0%	17.7%	2.5%	77.8%	2.0%	0.0%	100.0%	336,109
1980	0.0%	0.0%	26.1%	1.7%	70.3%	2.0%	0.0%	100.0%	190,984
1990	0.0%	0.0%	33.3%	2.8%	60.7%	3.2%	0.0%	100.0%	193,351
2000	0.0%	0.0%	37.5%	2.8%	57.4%	2.4%	0.0%	100.0%	264,249
share world population in 2000	6.5%	6.7%	11.4%	8.6%	55.4%	5.8%	5.5%	100.0%	

share in world poor (2 2005 dollars/day)

	Western Europe	Eastern Europe & USSR	Sub Sahara Africa	Latin America	Asia	Middle East & North Africa	Western Offshoots	World
1820	6.0%	5.6%	9.0%	1.7%	74.1%	3.0%	0.6%	100.0%
1850	4.1%	6.2%	8.5%	2.0%	75.3%	3.3%	0.6%	100.0%
1870	3.9%	5.5%	8.0%	2.7%	76.2%	3.2%	0.5%	100.0%
1890	2.4%	4.8%	6.2%	2.3%	80.7%	3.0%	0.6%	100.0%
1910	1.9%	3.7%	8.3%	2.0%	80.5%	3.3%	0.3%	100.0%
1929	1.4%	1.8%	10.1%	2.8%	80.6%	3.1%	0.3%	100.0%
1950	0.5%	0.2%	10.6%	1.7%	84.5%	2.4%	0.0%	100.0%
1960	0.1%	0.0%	11.8%	2.7%	82.5%	2.9%	0.0%	100.0%
1970	0.0%	0.0%	11.6%	2.4%	83.6%	2.3%	0.0%	100.0%
1980	0.0%	0.0%	13.6%	1.6%	82.9%	1.9%	0.0%	100.0%
1990	0.0%	0.0%	23.0%	2.8%	70.6%	3.6%	0.0%	100.0%
2000	0.0%	0.1%	29.0%	2.9%	65.0%	3.0%	0.0%	100.0%
share world population in 2000	6.5%	6.7%	11.4%	8.6%	55.4%	5.8%	5.5%	100.0%

Figure 1. Development of income and nutritional inequality in Kenya



Source: Moradi and Baten (2005). Notes: The gini coefficients are from Bigsten (1985) with a national coverage but based on national accounts of income groups, although Deininger and Squire (1996) label them as being based on taxpayers. Bigsten (1985) admits that his estimation technique overestimates the gini coefficients by about 20 percentage points. Birth cohorts were averaged from Kenya II and Kenya III, weighted by the coverage of female population.

Figure 2. Global income distributions: number of people with certain level of income (in dollars of 1990), 1820-2000