the review of income and wealth

Review of Income and Wealth
Series 60, Supplement Issue, November 2014
DOI: 10.1111/roiw.12144

GLOBAL INEQUALITY; LEVELS AND TRENDS, 1993–2005: HOW SENSITIVE ARE THESE TO THE CHOICE OF PPPs AND REAL INCOME MEASURES?

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Increasing global interaction between economies over the last few decades has led to growing interest on the implications of globalization. Of particular interest has been the distributional impact of globalization and whether this has been equity enhancing. Contributing to this debate, Chotikapanich *et al*. have previously estimated global and regional inequalities for 1993 and 2000. The current paper presents estimates of global inequality for 2005, making use of purchasing power parity (PPP) data from the 2005 International Comparison Program (ICP) round. A critical element in the estimation of regional and global inequality is the data on PPPs and real incomes. Another objective of the paper is to examine the sensitivity of the inequality results to the use of alternative sets of real incomes using different sets of PPP data to convert per capita income data into a common currency unit. The paper also compares levels and trends of global inequality measures based on real per capita income measures from the national accounts and those obtained using per capita expenditure data from household expenditure surveys. The main finding of the paper is that the populist view that globalization has increased inequality does not hold when inequality is measured at the global level. Between 1993 and 2005, inequality has consistently declined as measured both by the Gini coefficient and the Theil index. This decline in global inequality was the result of a decline in inequality between countries. The estimates do suggest that there is an overall upward trend in inequality within countries, lending some support for protestors against globalization. Another finding is that the levels of global inequality are indeed sensitive to the choice of PPPs. However, the downward trend in global inequality is consistently evident across different choices of PPPs and real incomes. We find similar trends in inequality and in the within and between components of inequality when inequality measures are based on national accounts real per capita incomes or on the survey-based real per capita expenditures.

JEL Codes: D31, E01, E31, O15, O57

Keywords: Gini coefficient, global inequality, International Comparison Program, Penn World Table, purchasing power parities, real per capita income, Theil's inequality measure

Notes: The revised version of the paper has greatly benefited from the comments and suggestions made by two anonymous referees and from the editor of the Special Issue, Marshall Reinsdorf. Authors Rao, Griffiths, and Chotikapanich gratefully acknowledge the funding support received from the Australian Research Council in the form of ARC Discovery Project DP1094632, and the helpful research assistance from Charley Xia. Rao's participation has also been facilitated by the ARC Discovery Project DP0985813. David Warner currently works for the Department of Foreign Affairs and Trade (DFAT) of the Commonwealth government of Australia. Part of this work was conducted when he was a student at the University of Queensland.

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1. Introduction

Increasing global interaction between economies over the last few decades has led to growing interest on the implications of globalization. Of particular interest has been the distributional impact that globalization may have had and whether this has been equity enhancing. For many, the nature of the relationship between globalization and inequality amounts to a verdict on globalization. Equity may concern the distribution of income within a country, or between countries within a region, or in the world as a whole. Around the same period of increasing globalization there is evidence to suggest there have been major shifts in economic policies in developing as well as developed countries. Major efforts toward microeconomic reform, including labor market reforms, technological and institutional changes, and major trends in migration across the globe, impact on levels of inequality. Increasing within-country inequality and also regional and global inequality can be a potential threat to the current international order. On the other hand, declining inequality, along with significant growth in real incomes, reinforces the benefits of globalization.

Current evidence on levels and trends in global inequality over the last three decades is mixed. The United Nations' Human Development Report 1999 (UNDP, 2009) cites that since the 1980s, income inequality has been rising within many countries, as well as at a global level. Bourguignon and Morrisson (2002) on the other hand conclude that there has been little change in inequality between the 1980s and early 1990s. There is a broad consensus among economists that the level of global inequality is high, with estimates of Gini coefficients ranging between 0.60 to 0.69 during the period 1980 to 2000. A body of related empirical literature includes Milanovic (2002, 2005a, 2005b), Bhalla (2002), Sala-i-Martin (2002a, 2002b, 2006), Sutcliffe (2003), and Chotikapanich *et al*. (2012). Estimates of global inequality are subject to revisions depending on the availability of internationally comparable real income data available from the International Comparison Program (ICP) at the World Bank. After the release of results on purchasing power parities (PPPs) and real incomes from the 2005 ICP (World Bank, 2008a), Milanovic (2009) revised his estimate of global inequality for the year 2002 upwards from a Gini value of 0.66 to 0.71. Milanovic's earlier estimate of 0.66 for the year 2002 was based on extrapolations of PPPs and real incomes from the 1996 ICP benchmark year whereas his revised estimate of 0.71 was based on the 2005 ICP, demonstrating the sensitivity of the inequality estimate to revisions in PPP and real income data.[1] The 2005 ICP results led to an upward revision of global inequality. Deaton (2013) explores the underlying causes and finds the somewhat systematic upward revision of PPPs, relative to the U.S. dollar, for low income countries as a plausible explanation. It seems that exactly the opposite may happen when ICP results of the new benchmark year 2011 are released. The initial reaction to the recent release of ICP data for the 2011 benchmark year is that it is likely to result in significant downward revisions to global inequality, induced by

[1]The major discrepancy between PPPs and real income data from the 2005 benchmark year, and the extrapolations from the 1996 benchmark year to 2005, was the subject matter of several studies including Deaton and Heston (2010), Chen and Ravallion (2010), and Deaton (2013).

downward revisions to PPPs of poorer countries and the resulting differences between 2011 real income data and extrapolations from 2005.

The apparent inconsistencies or disagreement between results from various studies are attributable to the differences in methodologies, differing measures of income, and differing sources of income data, and to the price data used to convert incomes into a common currency unit. Against this background, the principal objective of this paper is to compile a comparable set of inequality statistics derived using identical methodology and a single consistent source of data on incomes and inequality. A related aim is to examine the sensitivity of the inequality results to the use of different sets of PPPs for converting income data and to different income measures. We consider versions 6.1, 6.3, and 7.1 of the Penn World Table (PWT) (Heston *et al*., 2009), the ICP 2005 results from the World Bank (2008a), and results from World Development Indicators (WDI) 2007 (World Bank, 2007) which provide extrapolated PPPs from the 1996 benchmark years. In addition, we also consider constant 2005 and 1996 price estimates of real income which adjust PPPs for price movements over time. Finally, the paper examines differences in inequality estimates arising from using income measures from two different sources. The first income measure is from the ICP and the WDI—essentially a national accounts-based measure of per capita income. The second source is drawn from the PovcalNet of the World Bank which provides survey-based estimates of per capita income or consumption.

The paper is organized as follows. Section 2 sets out the conceptual framework and describes the methodology for computing regional and global inequality measures and Lorenz curves. The sources of data and country coverage are presented in Section 3. Empirical results from the study are presented in Section 4.

2. Measurement of Global and Regional Inequality

2.1. *Concept of Global Inequality*

A clear definition of global or world inequality is necessary since different studies, with varying objectives, have used a number of different concepts and measures. Some of the earlier studies focus on *between-country inequality*, treating each country as a single entity and using only real per capita income in each of the countries included in the study. Inequality measured in this way, with each country treated as equally important without according any weights to the size of the countries involved, has been called *inter-country inequality* (*Concept 1*) by Milanovic (2005a). This is a measure commonly used for studies of catch-up and convergence which aim to look at the convergence of incomes of different countries. A modified version of this measure, called *population-weighted inter-country inequality* (*Concept 2*) by Milanovic (2005a), considers the population size explicitly but assumes that every individual in a given country receives the same income. Examples of studies along these lines, which ignore within-country inequality, are Schultz (1998), Firebaugh (1999), and Melchior *et al*. (2000). Global inequality properly defined is obtained when inequality is calculated for all individuals around the globe, thereby taking into account inequality in the distribution of income within each of the countries considered. This approach is termed *global*

inequality between world citizens (*Concept 3*) by Milanovic (2005a). In a number of influential studies, Theil (1967, 1979, 1989, 1996) makes a similar distinction, referring to inter-country inequality as *international inequality* and global inequality as *world inequality*. Theil's studies focus on international inequality with the exception of Theil (1979), where some rough estimates of within-country inequality are used in the estimation of world inequality. It is only since the study of Chotikapanich *et al*. (1997) that the problem of accounting for inequality within countries has been given serious consideration.

In this paper we report results on all inequality concepts, but focus on global inequality (Concept 3) where inequality is estimated by taking into account the inequality within each country as well as inequality between countries. The methodology for doing so is described in the next section.

2.2. *Modeling Country, Regional, and Global Income Distributions*

Modeling regional and global income distributions is undertaken in two stages. In the first stage, we use data on mean income $\overline{y}$ in conjunction with population shares c_i and income shares g_i for a number of income classes, $i = 1, 2, \ldots, N$, to fit country-level beta-2 income distributions. In the second stage, the country-level income distributions are combined as population-weighted mixtures to form regional and global distributions. Data sources are described in the next section. Because we are examining the sensitivity of results to PPP choice and to alternative real income measures, a number of alternative sources for $\overline{y}$ are utilized, but we only use one set of income and population shares. The beta-2 distribution was chosen because of its simplicity, flexibility, and its superior fit over log-normal and other distributions. Estimation was carried out using the methodology that is described in Chotikapanich *et al*. (2007, 2012), and that was later extended by Hajarghasht *et al*. (2012). Once the country level distributions have been estimated, regional and global quantities of interest such as the Gini and Theil inequality measures, and Lorenz curves, can be found from the estimated parameters of the beta-2 distributions. In what follows we summarize the main components. More details can be found in Chotikapanich *et al*. (2007, 2012).

Suppose that a region (or the world) is made up of K countries, with the k-th country having a beta-2 income distribution given by

$$f_k(y) = \frac{y^{p_k - 1}}{b_k^{p_k} B(p_k, q_k)\left(1 + \frac{y}{b_k}\right)^{p_k + q_k}} \quad y > 0, \tag{1}$$

where y denotes income, $b_k > 0$, $p_k > 0$ and $q_k > 0$ are parameters, and $B(p_k, q_k)$ is the beta function. The cumulative distribution function (cdf) for income is given by $F_k(y) = B_{y/(b_k+y)}(p_k, q_k)$, where the function $B_t(p_k, q_k)$ is the cdf for the normalized beta distribution defined on the (0,1) interval, evaluated at t. This representation is convenient because $B_t(p_k, q_k)$ is readily computed by most statistical software. Once the distribution in (1) has been estimated for one measure of mean income, its estimate corresponding to an alternative income measure can be obtained by simply changing the scale parameter b_k accordingly.

The density function for the income distribution of a region is given by the mixture $f(y) = \sum_{k=1}^{K} \lambda_k f_k(y)$, where $\lambda_1, \lambda_2, \ldots \lambda_K$ are the population proportions for each country. The regional cdf is given by

$$F(y) = \sum_{k=1}^{K} \lambda_k F_k(y) = \sum_{k=1}^{K} \lambda_k B_{y/(y+b_k)}(p_k, q_k) \tag{2}$$

and regional mean income is

$$\mu = \sum_{k=1}^{K} \lambda_k \mu_k = \sum_{k=1}^{K} \frac{\lambda_k b_k p_k}{q_k - 1}, \tag{3}$$

where $\mu_k = b_k p_k/(q_k - 1)$ is mean income for the k-th country. A plot of a regional Lorenz curve, relating income shares to population shares, is obtained by plotting the regional cumulative income shares given by

$$\eta(y) = \frac{1}{\mu} \sum_{k=1}^{K} \lambda_k \mu_k B_{y/(y+b_k)}(p_k + 1, q_k - 1) \tag{4}$$

against $F(y)$, for a grid of values of y. The regional Gini coefficient can be written as

$$G = -1 + \frac{2}{\mu} \sum_{j=1}^{K} \sum_{i=1}^{K} \lambda_j \lambda_i m_{ij} \tag{5}$$

where $m_{ij} = \int_0^{\infty} y F_j(y) f_i(y) dy$. A closed form expression for m_{ij} when $i \neq j$ is not available, but m_{ij} can be evaluated numerically. The regional Theil coefficient can be written as

$$L = \ln(\mu) - \sum_{k=1}^{K} \lambda_k \ln(b_k) + \sum_{k=1}^{K} \lambda_k [\psi(q_k) - \psi(p_k)] \tag{6}$$

where $\psi(x) = d\ln\Gamma(x)/dx$ is the digamma function. Like the beta function, this function is readily calculated by most statistical software. Because L is additively decomposable into the inequality contributions from within countries L_W, and between countries L_B, we also examine decomposition of $L = L_W + L_B$ into these two components. Specifically,

$$L_W = \sum_{k=1}^{K} \lambda_k \ln\left(\frac{p_k}{q_k - 1}\right) + \sum_{k=1}^{K} \lambda_k [\psi(q_k) - \psi(p_k)] \tag{7}$$

and

$$L_B = \sum_{k=1}^{K} \lambda_k \ln\left(\frac{\lambda_k}{s_k}\right) \tag{8}$$

where $s_k = \lambda_k \mu_k/\mu$ is the income share of the k-th country.

3. Data and Country Coverage

The regional/global income distributions in this paper are estimated for the years 1993, 2000, and 2005. In the next two subsections we describe the data sources and discuss issues for (a) the income distribution data, and (b) data on per capita income at the country level. A third subsection lists the countries covered in our analysis.

3.1. *Income Distribution Data*

The main requirement for the computation of global inequality is data on inequality within each country. For this purpose we use population and income shares for 1993, 2000, and 2005, sourced from the UNU-WIDER World Income Inequality Database (WIID version 2c), and supplemented with some data from the World Bank PovcalNet website. Where possible, we relied on income shares based on individual data rather than household data. In some cases only expenditure shares are available and in such cases we make use of the expenditure shares. Also, ideally the income distribution data used should correspond to the years considered. However, for the case that the data are not available for the exact years, we consider a two year band on either side of the benchmark year. The problems associated with the use of secondary data on inequality for purposes of various analyses are well documented in Atkinson and Brandolini (2001), who describe the conceptual, measurement, and comparability issues encountered in using data of this type.

3.2. *Data on Real Per Capita Mean Income and PPPs*

There are two main issues related to the choice of a real per capita income variable $\bar{y}$. The first is the need to take into account differences in price levels across countries, and differential movements of prices over time in different countries. One of the main aims of the paper is to examine the sensitivity of the estimates of levels and trends in global inequality to the choice of PPPs used in deriving different measures of real per capita income. This aim is pursued by considering a range of PPPs available to convert per capita income and expenditure data into common currency units, thereby adjusting for differences in price levels across countries.

The second issue is whether to make use of per capita income/expenditure estimates constructed from household survey data, or per capita income data drawn from national accounts. The problem of divergence between the national accounts- and survey-based measures of per capita income have been well canvassed in Ravallion (2000), Deaton (2001), and other studies. Bhalla (2002) provides an excellent account of the issues and demonstrates the differences between national accounts- and survey-based estimates of per capita income. These differences are significant at any given point of time and there is evidence to support that survey growth rates of consumption are substantially less than the growth rates from national accounts. Milanovic (2002) estimates the ratio of survey-based incomes to national accounts-based incomes to be 54.5 and 53.4, respectively in

1988 and 1993. Given these issues, we consider both national accounts-based and survey-based estimates to measure global inequality levels and trends.

Differences in price levels across countries and over time are resolved by using country real per capita (mean) income data in PPP terms which can be obtained from a number of sources. Each source uses different methodologies and benchmark years. The choice of mean income data from these different sources is likely to have an impact on the findings of empirical studies.

In order to facilitate our investigation of the influence of the choice of PPP data on estimates of inequality we consider the following sets of PPP that are available in the public domain and which have been used in literature. These sets are described below.

(1) A set of PPPs for the year 2005 from the ICP benchmark are drawn from World Bank (2008a); PPPs for 1993 and 2000 are obtained as extrapolations of the 2005 ICP benchmark PPPs available from WDI (World Bank, 2008b). These are referred to in our results as "ICP (2005 prices)" to indicate that all these PPPs are in constant 2005 prices sourced from ICP.
(2) The PPPs for 2005 are sourced from the WDI (World Bank, 2007), which are essentially extrapolations from the 1996 ICP benchmark comparisons. These are denoted by "WDI (1996 prices)."
(3) We choose PPPs from PWT 7.1 which provides extrapolations of PPPs after incorporating ICP 2005 estimates of PPPs. A distinct feature of PWT 7.1 is worth noting. Adjustments to data from China are made because the 2005 ICP results for China are based on prices collected from only 11 capital cities.[2]
(4) PPP data in current and constant 2005 prices are sourced from PWT version 6.3 and are denoted by PWT 6.3.
(5) We obtain survey-based per capita income/expenditure estimates from the World Bank's PovcalNet website. PovcalNet estimates of real per capita expenditure are based on the PPPs from ICP 2005, with coverage limited to the developing countries. Consequently, we have a reduced dataset for this case.

The selection of different sets of PPPs is designed to assess the differences that arise from using PPPs from benchmark years compared to those obtained as extrapolations from previous benchmarks. We use WDI (2008), which uses the 2005 benchmark, whereas the WDI (2007) estimates are extrapolations from the 1996 ICP benchmark. As the 2005 and 1996 ICP benchmarks make use of the same Gini–Elteto–Koves–Szulc (GEKS) methodology, comparison between the ICP and WDI estimates for inequality illustrates the impact of the more recent price data.[3]

Our choice of PWT 7.1 and WDI (2008) estimates based on 2005 is designed to provide a handle on the differences that may arise due to the use of differing

[2]For details of this and other adjustments, and other aspects of compiling PPPs for 2005, see the Technical Appendix to PWT 7.1 (Heston *et al.*, 2012).

[3]At the time of preparing this revision, the World Bank has released PPPs based on the 2011 ICP benchmark. Results from the new benchmark are likely to show major revisions to the picture of global inequality. Preliminary estimates of global poverty from the 2011 ICP show significantly lower poverty numbers than those implied by extrapolations from 2005 ICP benchmark.

methodologies when compiling PPP data. The 2005 ICP round used the GEKS method[4] whereas PWT 7.1 used the Geary–Khamis (GK) method. There is considerable discussion over the effects of different aggregation methodologies on PPPs (see, e.g., Ackland *et al*., 2004; Dowrick and Akmal, 2005).

In addition to the use of PPPs from different benchmarks, we also consider the differences in global inequality estimates resulting from the use of current and constant price real income series from PWT 6.3 and 7.1. For the constant price series we use real GDP per capita constructed using a chain-based index. For both versions, it is denoted by RGDPCH and expressed in either "constant 1996 international dollars" or "constant 2005 international dollars." The RGDPCH series makes adjustments for differences in prices across countries and over time. For the current price estimates, we use the Real Gross Domestic Product per Capita series, denoted by CGDP.

3.3. *Country Coverage*

Our dataset includes 94, 92, and 93 countries for 1993, 2000, and 2005, respectively. These countries have income distribution data at a minimum of quintiles and PPP data from the 2005 ICP round. They cover all geographic regions and levels of economic development. However, the countries covered in each of these years are different. In order to facilitate comparisons of inequality measures across the three years, we present our results for the same set of countries for which we have data for all three years, limiting our analysis to 77 countries. These countries are listed in Table 1. In grouping countries into different regions we followed the classification used by Chotikapanich *et al*. (2012) and Milanovic (2002), thus making our results at the regional level comparable to those reported.[5]

For comparing results from national accounts per capita income with survey-based means, the country coverage of our study is reduced to 62 countries for which we are able to obtain survey-based data on per capita expenditure using the World Bank's PovcalNet. The country coverage is limited to developing countries and therefore does not include countries from Western Europe, North America, and Oceania. The countries with survey mean data are listed in the bottom panel of Table 1.

When studying the income distribution at the world level, a more important indicator of the coverage is the percentage of the world population included, rather than the number of countries. The population coverage of the sample is shown in Table 2. When using national accounts-based data, we cover roughly 82 percent of the world population in 1993, 2000, and 2005. The coverage for Africa is the lowest, accounting for 61 percent in 1993, 58.8 in 2000, and 54.6 percent in 2005. Although it would be ideal to have 100 percent population coverage, the coverage

[4]PPP data are calculated at a regional level and then aggregated. It should be noted that the African region price data were compiled using the Ikle method, which is a variation of the GK method that minimizes bias but provides additivity. A detailed outline of the methodology used by the ICP to calculate PPPs can be found in World Bank (2008a), with a critical review of this provided by Deaton and Heston (2010).

[5]We have results available for the full set of countries for each of the years.

TABLE 1

Country Coverage for 1993, 2000, 2005

Included countries when using National Account GDP as mean (77 countries)
Africa (16 countries)
Burkina Faso, Egypt, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Mali, Mauritania, Morocco, Nigeria, Senegal, South Africa, Tunisia, Uganda, Zambia
Asia (15 countries)
Bangladesh, China, Hong Kong, India, Indonesia, Iran, Jordan, Laos, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam, Yemen
Eastern Europe (16 countries)
Albania, Armenia, Bulgaria, Estonia, Hungary, Kazakhstan, Krygyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine
Latin America and the Caribbean (18 countries)
Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
Western Europe, North America, and Oceania (12 countries)
Australia, Austria, Cyprus, Czech Republic, Finland, Germany, Greece, Ireland, Sweden, Turkey, United Kingdom, United States
Countries included when using survey means (62 countries)
Africa (15 countries)
Burkina Faso, Egypt, Ethiopia, Ghana, Kenya, Madagascar, Mali, Mauritania, Morocco, Nigeria, Senegal, South Africa, Tunisia, Uganda, Zambia
Asia (13 countries)
Bangladesh, China, India, Indonesia, Iran, Jordan, Laos, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam
Eastern Europe (15 countries)
Armenia, Bulgaria, Estonia, Hungary, Kazakhstan, Krygyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine
Latin America and the Caribbean (18 countries)
Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
Western Europe, North America, and Oceania (1 country)
Turkey

achieved in this paper is comparable with studies in the literature.[6] The last four columns of Table 2 show the coverage when survey data on per capita consumption are used. In this case our coverage of countries from all regions is similar to the coverage we have for national accounts-based data with the exception of Western Europe, North America, and Oceania (WENAO), where data are only available for Turkey.

4. Results

The starting point for our empirical analysis is fitting country-specific income distributions. Decile or quintile share data are combined with real per capita income from ICP to fit distributions for all 77 countries in our dataset for the years 1993, 2000, and 2005. Goodness-of-fit for selected countries was assessed by comparing the observed income shares with the expected income shares derived

[6]Milanovic (2002) has a common sample that covers 84 percent of the world's population, while Sala-i-Martin (2002a, 2002b) covers 88 percent of the world's population. Dowrick and Akmal (2005) do not state their population coverage, but include 60 countries for 1980 and 53 countries for 1993.

TABLE 2

POPULATION COVERAGE

	World Population (in millions)			Population Included in the Study Using National Accounts Based Mean Incomes (in millions)						Population Included in the Study Using Survey-Based Mean Incomes (in millions)			
	1993	2000	2005	1993	%	2000	%	2005	%	1993	%	2005	%
Africa	672	813	896	407	61.0	478	58.8	489	54.6	406	60.4	488	54.5
Asia	3206	3628	3652	2834	88.4	3134	86.4	3336	91.3	2814	87.8	3308	90.6
Eastern Europe	411	365	391	327	79.6	320	87.7	361	92.3	324	78.8	358	91.6
Latin America and Caribbean	462	521	533	424	91.8	474	91.0	508	95.3	424	91.8	509	95.5
WENAO	809	852	845	563	69.6	598	70.2	620	73.4	60	7.5	73	8.6
World	5538	6179	6512	4555	82.3	5005	81.0	5315	81.6	4028	72.7	4736	72.7

Notes: Number of countries included in the study using national accounts-based and survey-based incomes are, respectively, 77 and 62.
Source: World Bank (2008a).

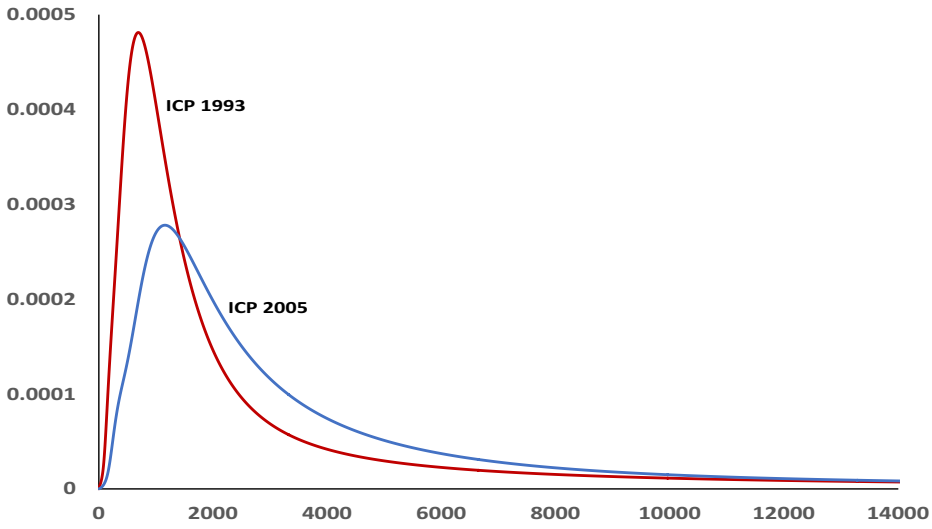

Figure 1. World Density Functions 1993 to 2005, ICP in 2005 Constant Prices

from the estimated distributions.[7] Once the country-specific income distributions were estimated, regional and global income distributions were obtained as population weighted averages of the country-specific distributions using the method described in Section 2.2. The resulting distributions are used to compute the Gini and Theil inequality measures presented in this section.

4.1. *Global Distribution of Income, 1993 and 2005*

A comparison of the density functions for the global income distributions for the years 1993 and 2005 is presented in Figure 1. Distributions for both of the years are highly skewed, indicating a high degree of inequality. Modes of around $1000 in 1993 and $1500 in 2005 imply low incomes for a significant proportion of the global population. The density functions also suggest that estimates of global poverty based on international poverty lines are likely to be sensitive to the location of the poverty line (Deaton, 2013). A shift in the density function to the right reflects a significant increase in world mean income from 1993 to 2005. The density functions for both years are essentially uni-modal, which does not provide evidence to support the twin-peaks hypothesis (Quah, 1996) or the existence of convergence clubs of high- and low-income countries.

Because the global income distributions are population-weighted averages of country-specific distributions, the shape and location of the global distributions are heavily influenced by the income distributions of China and India, shown in Figure 2. These distributions are consistent with the spectacular growth rates achieved by China and India over the last two decades. Bhalla (2011) reports average annual average growth rates in GDP in China of 8.2 and 10.5 percent,

[7]Detailed results with information on estimated parameters for the beta-2 distribution and the goodness-of-fit results can be obtained from the authors upon request.

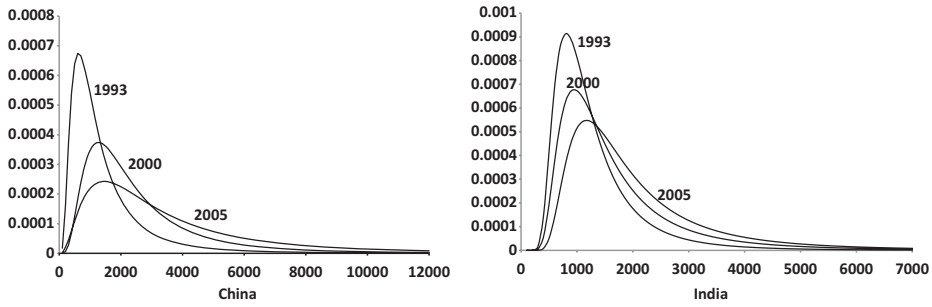

Figure 2. Density Functions over Time, China and India

respectively, during the 1990s and 2000s. The corresponding average growth rates for India were 5.7 and 6.8 percent per annum. During the same period, growth rates in GDP were considerably lower for high-income countries. At a global level, these high growth rates in China and India have a diminishing effect on between-country inequality. However, the density functions in Figure 2 show a significant shift to the right accompanied by a fattening of tails. This suggests an increase in disparity of income within China and India during the period 1993 to 2005.

Inequality in the distribution of income can also be assessed using Lorenz curves. The global Lorenz curves for 1993 and 2005 are presented in Figure 3. It is clear that the income distribution in 2005 Lorenz dominates the distribution in 1993, implying an unambiguous decline in inequality over this period. A particular feature in the figure is the significant increase in income shares of the population belonging to the fifth to eighth decile groups of the distribution. This increase is consistent with the growing middle class in China and India. The growth and influence of the middle class in the Asia-Pacific region, and in China and India in particular, is well documented. Kharas and Gertz (2010) estimate the size of the middle class to be 525 million in the Asia-Pacific region in 2009, accounting for 28 percent of the global middle class. This number is projected to increase to a spectacular 3.2 billion by 2030, which would then account for 66 percent of the global middle class.

4.2. *Global and Regional Inequality, 2005*

In Table 3 we report global and regional inequality estimates for 2005 computed using the methodology described in Section 2.2. The five regions are those described in Table 1. The inequality measures correspond to Concept 3 inequality where the distribution of income among all people of the region/world is taken into account. The mean incomes used and reported are the ICP real per capita incomes based on national accounts estimates of income for the 2005 benchmark year (World Bank, 2008a).

The Gini measure of global or world inequality for 2005 is estimated to be 0.6672, implying a high degree of inequality. To place this estimate in perspective, it is larger than the Gini coefficient of 0.64 for Zimbabwe in 2003, as reported by Mazingi and Kamidza (2011). Global inequality among all individuals of the world tends to be larger than that observed in individual countries because it includes

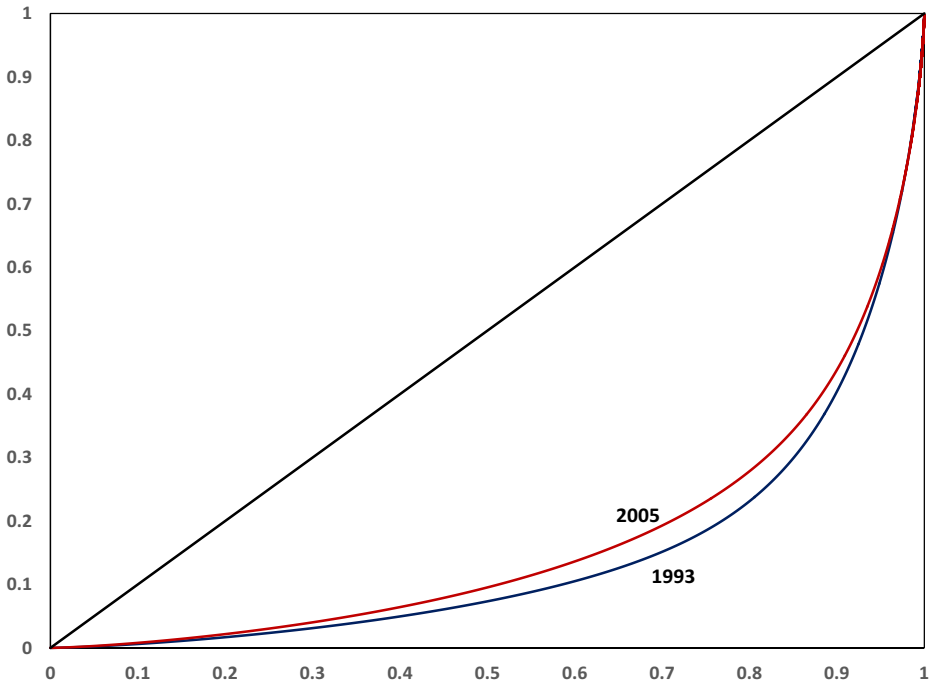

Figure 3. World Lorenz Curve, ICP (2005 prices)

TABLE 3
2005 Income Inequality

	POP	% of POP	Mean	Gini	Theil	Within	Between
Global	5,315,106,668	100.00%	7,664.78	0.6672	0.8514	0.3126	0.5388
						37%	63%
WENAO	619,819,109	11.66%	33,006.10	0.4548	0.4072	0.3096	0.0976
						76%	24%
LAC	508,634,984	9.57%	8,828.57	0.5486	0.5652	0.5254	0.0398
						93%	7%
Asia	3,335,804,420	62.76%	3,325.96	0.4754	0.3831	0.2901	0.0930
						76%	24%
Africa	489,404,072	9.21%	2,112.70	0.5230	0.4911	0.2682	0.2230
						55%	45%
EE	361,444,083	6.80%	10,131.90	0.4411	0.3571	0.2861	0.0710
						80%	20%

Notes: Mean incomes are real per capita GDP converted using PPPs from the ICP 2005. Means reported here are averages for the 77 countries in the study.

Source: World Bank (2008a); Authors' calculations.

inequality between countries as well as that within countries. Our 2005 estimate is the most recent one available. The nearest year estimate is 0.71 for 2002 by Milanovic (2009). The difference between his estimate and our estimate can be attributed to distributional changes over the period 2002 to 2005, changes in between country inequality, and differences in coverage of the

TABLE 4
GLOBAL INEQUALITY OVER TIME

	1993	2000	2005
Concept 1			
Gini	0.5246	0.5365	0.5245
Theil's L	0.2368	0.2524	0.2402
Concept 2			
Gini	0.6448	0.6649	0.6624
Theil's L	0.7189	0.6396	0.5388
Concept 3			
Gini	0.7084	0.6925	0.6672
Theil's L	1.0193	0.9465	0.8514
Within	0.3004 (29%)	0.3069 (32%)	0.3126 (37%)
Between	0.7189 (71%)	0.6396 (68%)	0.5388 (63%)

Notes: Per capita real incomes used in the calculations are all expressed in 2005 prices which are computed from ICP 2005 PPPs.

Source: Income distribution data from WIID (UNU-WIDER); mean incomes from World Bank (2008b); Authors' calculations.

samples.[8] Turning to inequality in the regions, we find that Latin America has the highest level of inequality with a Gini coefficient of 0.5486, followed by Africa with 0.5230, and then Asia, WENAO, and Eastern Europe with lower values. The regional measures are below the global Gini measure, the difference occurring because of between-region inequality.

The contribution of *between*-country inequality to global inequality can be examined using additively decomposable measures of inequality. We make use of Theil's inequality measure for this purpose. At the global level, between-country inequality contributes 63 percent of inequality with the rest attributable to *within*-country inequality. However, a different picture emerges when we focus on regional inequality. For example, between-country inequality accounts for only 7 percent of total inequality in the Latin American and Caribbean countries, implying that countries in this region have similar levels of per capita income but exhibit high degrees of inequality within each country. Surprisingly, high income countries from the WENAO region and countries in the Asian region exhibit similar levels of between-country inequality, accounting for 24 percent of their respective regional inequality measures. Africa is the region with a significantly larger contribution from between-country inequality.

4.3. *Trends in Global Inequality and Convergence*

Trends in global inequality and its *between* and *within* components provide useful information for assessing the effect of globalization on inequality and whether there is any evidence of convergence among countries. To facilitate such an analysis, we present in Table 4 measures of all three concepts of inequality for

[8]Milanovic's (2009) estimates are based on a sample of 123 counties accounting for 94 percent of the world population compared to 77 countries in our sample covering 82 percent of the world population.

the three years 1993, 2000, and 2005. Concept 1 inequality, a measure of inequality purely based on per capita incomes of countries, is commonly used in studying convergence of incomes across countries. Concept 2 inequality is similar to Concept 1 but it allows for differing sizes of countries. Concept 3 measures global inequality among people of the world, encompassing within-country inequality as well as inequality between countries. Consistent with the rest of the analysis in the paper, we rely on Gini and Theil measures of inequality instead of the standard deviation of logarithms of incomes measure commonly used in convergence studies based on Concepts 1 and 2 measures of inequality (see Ravallion, 2014).

Our measure of Concept 1 inequality shows a slight increase from 1993 to 2000 and then a decline from 2000 to 2005. These levels of international inequality are well below the corresponding measures of global inequality, highlighting the essential difference between Concepts 1 and 3. The levels and trends of international inequality we report here are similar to those reported in Figure 1 of Milanovic (2009, p. 9). Our numbers suggest a small degree of convergence for the period 2000 to 2005, the period of strong growth performance from both China and India. The decline in international inequality from 2000 to 2005 is consistent with Fisher's (2003) assessment of globalization and its effects on inequality and poverty.

Estimates of population weighted measures of international inequality are significantly higher than the unweighted measures under Concept 1 inequality, reflecting the fact that many of the low-income countries have a large population weight. Using the Gini version of this measure there is a slight increase in inequality from 1993 to 2000 but a marginal reduction from 2000 to 2005. When we use Theil's measure, we find a steady decline in Concept 2 inequality.[9] This decline is consistent with Milanovic (2009) and in all likelihood driven by the strong growth performance of China and India. We find further evidence of the contribution of China and India in the results reported in the bottom panel of Table 5 where we observe an increase in this measure of inequality (between-country) for the world without China and India.

Trends in global inequality (Concept 3) are shown in the bottom panel of Table 4. Our main finding is that both the Gini and Theil measures show a steady decline in global inequality over the years 1993 to 2005. The Gini measure declined from 0.7084 in 1993 to 0.6925 in 2000 and decreased further to 0.6672 in 2005. The Theil index shows an even more significant decline, from 1.0193[10] in 1993 to 0.9465 in 2000 and then to 0.8514 in 2005.

Decomposition of inequality into contributions from within and between countries is useful for understanding the factors driving the overall downward trend in global inequality. Decomposition of the Theil index reported in the last three rows of Table 4 reveals that the driving force has been the decline in inequality between countries, in both absolute and relative terms. In 1993, Theil's between-country inequality measure is 0.7189, accounting for 71 percent of total global inequality. The corresponding values in 2005 are 0.5388 and 65 percent. In

[9]Theil's Concept 2 inequality measure is identical to Theil's measure of *between* country inequality.

[10]Theil's measure is not bounded at 1 like the Gini coefficient. If the number of countries is K, the upper bound for Theil's measure is $\ln K$.

TABLE 5
GLOBAL INEQUALITY WITH AND WITHOUT CHINA AND INDIA, 2005

	World	Without China	Without India	Without China & India
1993				
Population	4,555,316,259	3,364,745,606	3,670,373,381	2,479,802,728
Mean	5,766.4	7,274.07	6,849.52	9,415.23
Gini	0.7084	0.6952	0.6996	0.6597
Theil	1.0193	1.0120	1.0343	0.9519
Within (%)	0.3004	0.2816	0.3340	0.3246
	29%	28%	32%	34%
Between (%)	0.7189	0.7304	0.7003	0.6273
	71%	72%	68%	66%
2000				
Population	5,005,224,109	3,736,370,747	4,001,099,885	2,732,246,523
Mean	6,791.77	8,193.47	8,065.09	10,573.30
Gini	0.6925	0.7050	0.6857	0.6801
Theil	0.9465	1.0438	0.9578	1.0305
Within (%)	0.3069	0.3172	0.3308	0.3561
	32%	30%	35%	35%
Between (%)	0.6396	0.7266	0.6269	0.6745
	68%	70%	65%	65%
2005				
Population	5,315,106,668	4,008,792,856	4,221,543,242	2,915,229,430
Mean	7,664.78	8,834.54	9,100.05	11,351.70
Gini	0.6672	0.6865	0.6602	0.6667
Theil	0.8514	0.9372	0.8575	0.9271
Within (%)	0.3126	0.2867	0.3399	0.3164
	37%	31%	40%	34%
Between (%)	0.5388	0.6505	0.5176	0.6106
	63%	69%	60%	66%

Notes: Population total is for the 77 countries in the study. Mean incomes used in the calculations are all expressed in 2005 prices which are computed from ICP2005 PPPs.

Source: Income distribution data from WIID (UNU-WIDER, 2008). Mean incomes are from *World Development Indicators, 2008* (World Bank, 2008b) and authors' calculations.

contrast, within-country inequality posted a slight increase from 0.3004 (accounting for 29 percent) in 1993 to 0.3126 (accounting for 37 percent) in 2005.

Estimates of global inequality presented in Table 4 are anchored on ICP 2005 PPPs and real per capita income expressed in constant 2005 prices.[11] For the years 1993 and 2000 they are significantly larger than those from almost all other studies that use alternative PPP and per capita income measures, including Milanovic (2002, 2005a), Dowrick and Akmal (2005), and Sala-i-Martin (2006). For the year 2000, the closest estimate is from Dikhanov (2005), who reports a Gini value of 0.684 compared to our estimate of 0.692. The only other study[12] which anchors its estimates on ICP 2005 is the work of Milanovic (2009), where he re-estimates his global inequality estimates for the years 1988, 1993, 1998, and 2002. Consistent with the trends reported in our Table 4, he finds that revised inequality estimates

[11]Sensitivity of our estimates of inequality to alternative choices of PPPs and real income measures is discussed at length in the ensuing sections.

[12]Ram (2009) also uses ICP 2005 figures but he calculates only Concept 2 international inequality. His estimate is 0.64 compared to our estimate of 0.5388.

based on ICP 2005 are systematically higher than those based on an ICP 1993 benchmark. For 1993, he reports a global inequality Gini measure of 0.699 compared to our estimate of 0.7084.

4.4. *What is the Influence of China and India?*

The large populations of China and India mean that shifts in the income distributions and growth rates of real per capita incomes in these countries will have a big influence on the shape of the world income distribution and on measures of global inequality. In Table 5 we compare world inequality measures with those obtained when China and India are excluded, separately, and then both together. In 2000 and 2005, excluding China leads to greater world inequality, driven by significantly larger values for between-country inequality. The effect of excluding India is less clear cut. It depends on whether one adopts a Theil or Gini measure. Between-country inequality is lower. A similar conclusion is reached when both India and China are excluded. Changes in the Theil and Gini measures are not in the same direction; between inequality is less in 2000 but greater in 2005. The different impacts from exclusion of China and India reflect their different growth rates that we reported earlier. In 2005, excluding China led to an increase in between-country inequality from 0.5388 to 0.6505, whereas dropping India led to a decline in between-country inequality from 0.5388 to 0.5176. These results signify the importance of China and India in the world economy and in the process of convergence (Fisher, 2003; Milanovic, 2009).

4.5. *Global Inequality: National Accounts versus Survey Means*

In this section we revisit the debate surrounding the use of income or consumption data from national accounts versus data from household expenditure surveys for measuring inequality and poverty. Survey-based estimates of per capita income or expenditure tend to be systematically lower than the national accounts-based estimates. Milanovic (2002) reports an average for the ratio of survey-based income/expenditure to national accounts-based estimates to be around 53 percent; his analysis suggests a negative relationship between this ratio and real per capita GDP. Ravallion (2000), Deaton (2001), and Bhalla (2002) summarize the issues involved and provide a systematic analysis of the differences and sources of divergence in incomes based on these two sources. Bhalla (2002) reports increasing divergence between estimates from the two sources, estimating the ratio to be 55 percent in 1968, decreasing to 40 percent in 1998.

The data source for real per capita income/expenditure can significantly influence measures of inequality as well as estimates of poverty incidence at the national, regional, and global level. Recognizing the importance of this issue, we examine the effect of this choice on the levels and trends in global inequality. The results presented thus far in this paper are based on national accounts measures of real per capita income sourced from the World Bank and the ICP. For a comparison with these results, we use data on survey-based means drawn from the World Bank's PovcalNet website. As the focus of the World Bank is on the developing world, our data on mean incomes from household expenditures are limited to countries from the developing world. We include data for 62 countries as shown in

TABLE 6

Global Inequality, using Survey Means

1993	ICP (2005 prices)	PWT7.1 (2005 prices)	PWT7.1 (current prices)	Survey Mean
Mean	2961.43	3382.92	2599.17	1241.53
Gini	0.5980	0.6153	0.6003	0.6234
Theil's L	0.6456	0.6886	0.6520	0.7018
Within (%)	0.3062	0.3062	0.3062	0.3062
	47%	44%	47%	44%
Between (%)	0.3395	0.3824	0.3458	0.3956
	53%	56%	53%	56%
2005	ICP (2005 prices)	PWT7.1 (2005 prices)	PWT7.1 (current prices)	Survey Mean
Mean	4337.32	4469.11	4469.11	1462.78
Gini	0.5425	0.5350	0.5350	0.5423
Theil's L	0.5226	0.5132	0.5132	0.5161
Within (%)	0.3133	0.3133	0.3133	0.3133
	60%	61%	61%	61%
Between (%)	0.2093	0.1999	0.1999	0.2028
	40%	39%	39%	39%

Notes: ICP (2005 prices) means that the mean incomes are expressed in constant 2005 prices derived using ICP 2005 results; PWT7.1 (2005 prices) means that mean incomes are from PWT7.1 and these are expressed in constant 2005 prices; PWT7.1 (current prices) means that mean incomes are expressed in PPPs terms but are in current prices. Therefore, mean incomes from PWT7.1 (current prices) are not comparable across the years 1993 and 2005; Survey means are annual averages expressed in constant 2005 dollars derived using ICP 2005 results.

Source: Income distribution data from WIID (UNU-WIDER, 2008); Mean incomes from the *World Develoment Indicators, 2008* (World Bank, 2008b); PWT7.1 data from PWT web site; Survey means from PovcalNet, World Bank.

Table 1. To ensure a valid comparison with results from using national accounts means, we recomputed our previously reported results, restricting our estimates to be from the same set of 62 countries. Our results focus on the two endpoints of our study, 1993 and 2005.

In Table 6, we present inequality measures computed using incomes from survey-based means and several national accounts means. We first notice that, consistent with other work, mean income/expenditures from survey data are well below those from national accounts. Turning to inequality, in 1993 the survey-based data show a higher level of inequality for both the Gini and Theil measures, with both data sources making roughly similar contributions to within- and between-country inequality. In 2005, both sources of data result in the same level of inequality and almost identical contributions from the within- and between-country components. Another feature of note from the table is the significant decline in inequality in the developing world from 1993 to 2005. This conclusion is robust with respect to the choice of means and to the inequality measure used. The source of the decline is a big drop in between-country inequality. The within component of Theil's measure remained constant at around 0.31, but, using the survey-mean column as an example, between-country inequality fell from 0.3956 in 1993 to 0.2028 in 2005.

The identical within-country inequality appearing in Table 6 for all measures of mean income is to be expected. Inequality within any country does not depend on that country's mean income. However, what is fascinating is that, for 2005, the different means lead to almost identical between-country inequality. This can happen if the ratio of national accounts to survey-based mean incomes is roughly constant across countries, a scenario that could arise because our sample of 62 countries is predominantly from the developing world.

Given our focus on the developing world, we compare our estimates of between-country inequality based on survey-based data with results reported in a recent study by Ravallion (2014). Using a mean logarithmic deviation (MLD) measure, he finds a decline in between-country inequality of about 22 percent from 1993 to 2005. Using Theil's measure, we find that between-country inequality roughly halved, declining from 0.3956 to 0.2028 over the same period.[13]

4.6. *Sensitivity of Inequality Measures to the Choice of PPPs and Real Income Measures*

We now turn to an assessment of the sensitivity of global inequality estimates to the choice of PPPs used to convert per capita income data.[14] Researchers have a range of options, a few of which were listed in Section 3.2; those that we use for our comparison are given in Table 7. As mentioned previously, changing mean incomes can influence between-country inequality, but it does not change within-country inequality. Results for the years 1993, 2000, and 2005 are reported in Table 7. We find interesting patterns in the results.

First, we compare inequality estimates across columns for each of the three years. In each row, inequality measures based on ICP 2005 prices and on PWT 7.1 2005 prices (first and fifth columns) are higher than those based on earlier versions of PWT (6.3 and 6.1) and on WDI (2007) (columns (2) to (4)). Thus, if one is interested in the *level* of inequality, it is important to select the most appropriate PPP to convert per capita incomes. Second, we examine trends in inequality by shifting focus to changes down each column where real incomes are based on a particular set of PPPs. For example, in the first column (ICP 2005 prices) there is a steady decline in inequality as measured by a Gini coefficient from 0.7084 in 1993 to 0.6672 in 2005. Theil's index declines from 1.0193 to 0.8514. A similar trend in inequality is evident when we use PWT 7.1 data in 2005 prices (column 5). The remaining columns show a similar declining trend over the period 1993 to 2005, but show an increase from 1993 to 2000 and then a decrease from 2000 to 2005. If one is interested only in trends in global inequality, the choice of PPPs is not that critical, but for assessing the level of global inequality, it can make a significant difference. In Figure 4, we present the estimated density functions for the global distribution of income for the years 1993, 2000, and 2005 based on two sets of

[13]Because the MLD and Theil measures are different and non-linear, it is not strictly possible to compare the percentage declines; we focus just on trends.

[14]In this section we revert to national accounts based estimates of per capita income drawn from World Bank sources.

TABLE 7

GLOBAL INEQUALITY, VARIOUS PPPS

1993	(1) ICP (2005 prices)	(2) PWT6.3 (2005 prices)	(3) PWT6.3 (current prices)	(4) PWT6.1 (1996 prices)	(5) PWT7.1 (2005 prices)	(6) PWT7.1 (current prices)
Mean	5766.4	6607.46	5290.82	5696.65	6137.41	4793.03
Gini	0.7084	0.6583	0.6569	0.6569	0.7074	0.7019
Theil's L	1.0193	0.8239	0.8211	0.8229	1.0026	0.9830
Within (%)	0.3004	0.3004	0.3004	0.3004	0.3004	0.3004
	29%	36%	37%	37%	30%	31%
Between (%)	0.7189	0.5235	0.5207	0.5225	0.7022	0.6826
	71%	64%	63%	63%	70%	69%
2000	ICP (2005 prices)	PWT6.3 (2005 prices)	PWT6.3 (current prices)	PWT6.1 (1996 prices)	PWT7.1 (2005 prices)	PWT7.1 (current prices)
Mean	6791.77	8758.66	7807.58	7504.66	6925.2	6084.16
Gini	0.6925	0.6844	0.6767	0.6799	0.6822	0.6816
Theil's L	0.9465	0.9017	0.8755	0.8936	0.9086	0.9052
Within (%)	0.3069	0.3069	0.3069	0.3069	0.3069	0.3069
	32%	34%	35%	34%	34%	34%
Between (%)	0.6396	0.5948	0.5685	0.5867	0.6017	0.5983
	68%	66%	65%	66%	66%	66%
2005	ICP (2005 prices)	PWT6.3 (2005 prices)	PWT6.3 (current prices)	WDI, 2007	PWT7.1 (2005 prices)	PWT7.1 (current prices)
Mean	7664.78	9181.33	9181.33	8976.00	7906.12	7906.12
Gini	0.6672	0.6165	0.6165	0.6144	0.6634	0.6634
Theil's L	0.8514	0.7091	0.7091	0.7065	0.8439	0.8439
Within (%)	0.3126	0.3126	0.3126	0.3126	0.3126	0.3126
	37%	44%	44%	44%	37%	37%
Between (%)	0.5388	0.3965	0.3965	0.3939	0.5313	0.5313
	63%	56%	56%	56%	63%	63%

Notes: ICP (2005 prices) means that the mean incomes are expressed in constant 2005 prices derived using ICP 2005 results; PWT7.1 (2005 prices) means that mean incomes are from PWT7.1 and these are expressed in constant 2005 prices; PWT7.1 (current prices) means that mean incomes are expressed in PPPs terms but are in current prices. PWT6.3 and PWT6.1 figures are all based on ICP 1996; and WDI 2007 mean income (at the bottom of column 4) are expressed in 2005 prices but obtained as extrapolations from 1996.

Source: Income distribution data from WIID (UNU-WIDER, 2008); ICP means incomes from the *World Development Indicators, 2008* (World Bank, 2008b); WDI 2007 are drawn from the *World Development Indicators, 2007* (World Bank, 2007); PWT6.3, PWT6.1 and PWT7.1 data are from PWT web site; Survey means are from PovcalNet, World Bank. Authors' calculations.

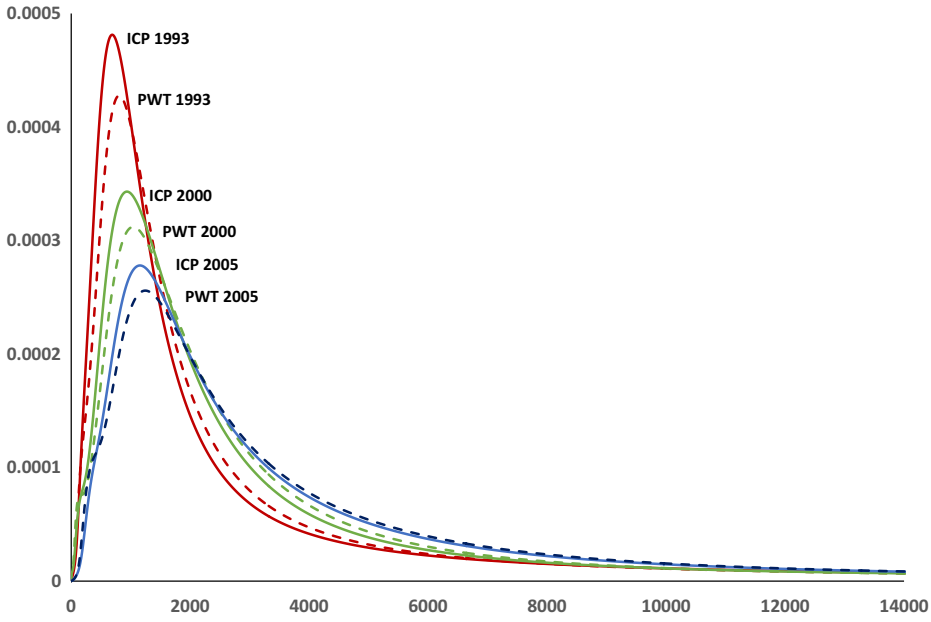

Figure 4. World Density Functions over Time, ICP and PWT in 2005 Constant Prices

PWT and ICP PPPs. Explanations for the systematic differences in income distributions derived using different sources of PPPs are explored below.

4.7. *ICP 2005 PPPs versus WDI extrapolated PPPs from 1996*

For this purpose, we focus on the first and fourth columns of Table 7 for the year 2005. The first column refers to PPPs for 2005 obtained from ICP 2005 published in World Bank (2008a). The fourth column refers to PPPs for 2005 obtained by extrapolating the 1996 PPPs to 2005. These data are taken from the *World Development Indicators* publication (World Bank, 2007). Thus, observed differences are due to differences between PPPs from the ICP 2005 benchmark and PPPs for 2005 obtained as extrapolations from 1996. In 2005, real per capita income of the world (for our sample of 77 countries) is $8976 when extrapolations of PPPs from 1996 are used, but only $7664 when PPPs from the ICP 2005 benchmark are used. The size of global GDP, or the world economy, underwent a significant downward revision when ICP 2005 PPPs were released (World Bank, 2008a), leading to considerable debate and comment. Deaton (2013) provides an excellent account of how the 2005 ICP results reshaped the size and structure of the world economy. He identified systematically higher PPPs in the ICP 2005 benchmark for countries in the developing world as the main source of the downward revision. It has the obvious effect of a higher inequality estimate for the year 2005 when ICP 2005 PPPs are used. Milanovic (2009) also documents how the two sources show big differences in real per capita incomes of a number of low- and

middle-income countries. Deaton and Heston (2010) provide a systematic analysis of the sources of differences. The PPP and real income data released in ICP 2005 had a profound effect on estimates of global poverty produced by the World Bank, leading to Chen and Ravallion (2010)'s work entitled "The Developing World Is Poorer than We Thought, but No Less Successful in the Fight against Poverty." Differences similar to those observed for 2005 can also be seen for the years 1993 and 2000.

4.8. *PPPs from ICP 2005 and from PWT 7.1*

In this section we focus on a comparison of the results presented in columns (1) and (5) of Table 7. The data used to compile PPPs in ICP 2005 and PWT 7.1 are essentially the same. However, the PWT7.1 mean incomes are higher and the PWT7.1 inequality measures are lower. What are the possible reasons for these systematic differences? The first, and a major driver of the differences, is the adjustment to ICP price data made in the process of constructing PWT 7.1. In PWT 7.1, price data for China were adjusted downwards to account for possible urban bias present in ICP prices for consumption goods. The Chinese prices for consumption goods were collected from only 11 capital cities. PWT 7.1 PPPs were computed after making a 20 percent downward adjustment to prices from China.[15] Other explanations for the differences between ICP 2005 and PWT 7.1 come from differences in methods used to aggregate basic heading price data when deriving PPPs at the GDP level. The ICP uses the GEKS method for aggregation whereas PWT 7.1 uses the GK method.[16] It is generally recognized that use of the GK method induces a downward bias in PPPs and, relative to the GEKS method, an overstatement of the real incomes of low income countries. Further, use of the GK method is likely to understate the true level of inequality. Dowrick and Akmal (2005) provide analytical arguments to establish the downward bias in inequality induced by the GK method. Other differences in the PWT and ICP compilation methodologies relate to the process of linking regional comparisons to derive global comparisons.

5. Conclusion

In this paper, we present estimates of global inequality based on income distribution data for 1993, 2000, and 2005 and real income data for 2005 available from a number of sources. Results on regional inequality for 2005 are also provided. We examine levels and trends in global inequality and do not find support for the populist view that globalization has an adverse effect on inequality. Between 1993 and 2005, global inequality has declined. This conclusion is robust to the use of different sources of PPPs and also to the use of national accounts-based and survey-based measures of per capita income. The observed decline in inequality reported here is largely due to a reduction in inequality between

[15]Feenstra *et al.* (2013) provide a more systematic examination of the urban bias in Chinese consumption prices and report results which largely justify the use of a 20 percent downward adjustment used in PWT 7.1.

[16]Diewert (2013) provides a good exposition of these methods and their relative merits.

countries. It is in no small measure due to the spectacular growth performance of China and India, the two most populous countries of the world. The estimates do suggest an upward trend in inequality within countries which does add support to the notion that globalization may be worsening inequality within countries. Despite reductions in global inequality over the study period, a Gini coefficient of 0.67 represents an extreme level of inequality. Measurement of the level of inequality is sensitive to choice of PPPs and real per capita income measures, but it remains high irrespective of these choices.

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