New Estimates of Global Poverty and Inequality: How Much Difference Do Price Data Really Make?

Peter Edward and Andy Sumner

Abstract

This paper makes new estimates of global poverty and inequality in 2012 using both 'old', 2005 and 'new', 2011 purchasing power parity (PPP) price data in order to assess systematically what difference PPP data makes to the estimates. The methodology for the 2011 PPP data is thought to be superior. However, contentions remain. We discuss the PPPs and justify the use of 2011 PPP data to estimate global poverty and inequality, at least for comparison purposes.

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New Estimates of Global Poverty and Inequality: How Much Difference Do Price Data Really Make?

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Executive Summary

This paper makes new estimates of global poverty and inequality in 2012 using both 'old', 2005 and 'new', 2011 purchasing power parity (PPP) price data. The methodology for the 2011 PPP data is thought to be superior. However, contentions remain. We discuss the PPPs and justify the use of 2011 PPP data to estimate global poverty and inequality, at least for comparison purposes.

Those at the bottom of the global distribution consume no more than they did at a given point in time. However, our estimates of the value of what they consume have changed – which implies that our poverty lines should change. We argue that far from indicating a major change in our understanding of global poverty levels, the new price data merely reminds us that very low poverty lines (such as the commonly used extreme poverty line of $1.25 a day in 2005PPP) are so hypersensitive that they may not be very robust or useful as a measure of real changes in the living conditions of the 'poor'. In fact, a dime – 10 cents - here or there, on or off, a global poverty line, even if it does have an underlying logic to its basis, can make a difference to global poverty of the order of 100 million people. This is a generic point rather than related to the PPP revision.

From the point of view of a wider perspective on the global distribution the impact of the new PPPs is considerably less substantial than it may have first appeared. Differences in poverty estimates between the PPP rates are much smaller as the poverty line rises above $5 a day and towards $10 a day, and notably, the number of people living at or below the peak of the global distribution curve has remained steady at 33% throughout the period 1990-2012, being the same whether one uses 2005PPP or 2011PPP.

The updated PPP figures, we argue, therefore raise questions about the usefulness and relevance (again) of relying on any single global poverty line, and especially one that is set low, because such estimates of global poverty are hypersensitive to minor changes at the lower tail of the global distribution (while not taking into account what is happening across the entire global distribution). Furthermore, although global inequality is lower if one uses 2011PPP, the change is not that large and the much heralded fall in global inequality since the end of the Cold War, almost evaporates when China is removed whether one uses 2005 or 2011 PPPs. Global inequality between countries is about the same as inequality within Brazil and global inequality between individuals is still about the same as inequality in South Africa.

We also find that the primary difference in the global distribution between use of 2005 PPP and 2011 PPP is less than it may at first seem. The commonality is that the clear global 'twin peaks' demarcation between a poor peak and a rich peak that existed at the end of the Cold War is no longer so readily discernible. We conclude that it is important to consider what is happening across a wider range of poverty lines and to understand the (relatively slowly) changing shape of global consumption distribution.

Approaches to global poverty need to be informed by a broader understanding of the overall global consumption distribution and of how very modest changes to the assumed poverty line lead to significantly different understandings of the scale and location of global poverty. It would therefore be better, we suggest, to make estimates with a range of poverty lines, probably up to at least $10-a-day, so as to pay greater attention to the global distribution overall.

1. Introduction

In 2014, new price data, Purchasing Power Parity (PPP) estimates were released by the International Comparison Programme (ICP) based on data collected in 2011. The methodology for the 2011 data is thought to be superior to that used to estimate the previous 2005 PPP rates. However, contentions remain as to whether the new 2011 PPPs should be used for estimating global poverty and inequality. The changes to the PPPs are not trivial for many countries and in particular a number of populous countries that matter to both global poverty and global inequality estimates have quite different data in 2005 and 2011 PPPs. In light of this, the purpose of this paper is simple: first, to make new estimates of global poverty and inequality up to 2012; and second, to ask how much difference the choice of price data makes to estimates of global poverty and inequality. It is worth noting at the outset that the PPP revision does not change what people actually consume. However, they do change estimates of the value of what they consume – which also implies that poverty line values should change.

Others have addressed some of these questions with preliminary estimates in blogs taking the 'new' (2011) PPP and making estimates for global poverty in 2010 based on various adjustments to the $1.25 poverty line (e.g. Chandy and Kharas, 2014; Dykstra et al., 2014) and find that the new PPP rates substantially reduced poverty estimates at such poverty lines. Others made some estimates in blogs of global inequality (Milanovic, 2014), and Inklaar and Rao (2014) also make some estimates of global inequality in discussing the robustness of the new PPPs, however our paper is, to the authors knowledge, the first systematic attempt to make global poverty and inequality estimates over time for 1990-2012 that probe the difference price data makes to estimates of global poverty and inequality themselves.[1] We also make some projections to 2030 for global poverty. It might seem that because the 2011 PPPs effectively halved estimates of global poverty at the 'extreme' global poverty line (equivalent to $1.25 a day in 2005PPP) they have caused a major change in our understanding of the scale of global poverty. In this paper we demonstrate how the revision of the PPPs merely reminds us of the problems of focusing on lower poverty lines where poverty estimates are hypersensitive to both the value of the PPP$ poverty line and to changes in the value of the PPP rates.

This paper is structured as follows: Section 2 discusses the revision of the PPPs and the use of PPPs for the estimation of global poverty and inequality. Section 3 covers our model - the Growth, Inequality and Poverty (GrIP) model - and its revision to a version 2.0 (henceforth v2.0), in light not only of the new PPP rates but also of the latest survey data additions. We also review key methodological limitations in addition to the PPPs drawing from the work of Lahoti et al., (2014) and others in Section 4. Section 5 then focuses on how the choice of price data generates different pictures of global poverty and inequality. Section 6 concludes.

[1] Milanovic (2009) conducted a similar exercise for global inequality when the 2005 PPP data were released.

2. Purchasing Power Parity

Market exchange rates are thought to be misleading for comparisons between countries, since, for instance, the price of rice in China is very different to the USA. Purchasing power parity (PPP) exchange rates attempt to deal with this problem by estimating the local, rather than international, purchasing power of a country's currency. This is done by comparing prices across countries for similar items in order to estimate how many US dollars it would cost to buy an equivalent basket of goods in the USA compared to the local in-country cost of that basket of goods. These numbers matter for various reasons not least because they feed into the estimates of global poverty and global inequality.

The International Comparison Program (ICP) is responsible for the production of PPP data. The ICP was established in the late 1960s on the recommendation of the UN Statistical Commission (UNSC). Initially it was conducted by the UNSC and University of Pennsylvania and launched in 1968 with the first round in 1970 in 10 countries. The ICP 2005 round of data collection covered 146 countries. The ICP 2011 data collection covered 199 countries. Both the 2005 and 2011 rounds were housed by the World Bank Global Office with regional offices around the world.

The 2011 round, released in 2014, has proved contentious as there are some substantial changes in countries that are of significance to global poverty and inequality. The 2011 round was also published three years later than the original ICP timetable. One reason may well have been that China fully participated in the 2011 round, following all the procedures and methods, but chose not to 'endorse' the PPPs estimated for China as official statistics. ICP (2014b, p. 27) in the statistical annex notes:

> The National Bureau of Statistics (NBS) of China has expressed reservations about some aspects of the methodology employed in the 2011 ICP round and did not agree to publish the headline results for China. Those results were estimated by the 2011 ICP Regional Office in the Asian Development Bank and the 2011 ICP Global Office in the World Bank. However, the NBS of China does not endorse these results as official statistics.

Given the importance of China to estimates of global poverty and inequality this is worthwhile to be aware of.

The use of the ICP data is endemic in the development community from the UNDP estimation of the Human Development Index (of which GDP PPP per capita is a component), to the World Bank's global poverty estimates, to the IMF's World Economic Outlook economic growth projections, the Penn World Table, and a range of data in the World Bank's World Development Indicators.

Significant contentions arise, not least over whether it is possible to develop a meaningful comparison basket of goods (since what may be considered a staple necessity in one country may be a rarely consumed in another) and, of relevance to poverty estimates, whether a

basket representative of average consumption habits is appropriate as a measure of the buying power of the poor who spend most of their money on food and other necessities). Such contentions with the PPPs are by no means new (see, for discussion, Anand and Segal, 2008; Chen and Ravallion, 2010; Deaton, 2005; 2010; 2011; Deaton and Heston, 2010; Deaton and Dupriez, 2011; Edward and Sumner, 2013a; 2013b; 2014; Klasen, 2010; Milanovic, 2009; Ravallion et al. 2008).[2]

A central issue is that as Deaton and Aten (2014, p. 1) note the 2011 PPPs are 'sharply different' from what one might have expected based on extrapolation of the 2005 PPP round using relative inflation rates for each country. They associate this issue with the aggregation method used in ICP2005. Prices were collected and compared across all countries in a region. The regions of the world were then linked using a 'ring' of 18 countries across the regions (the PPPs for these countries were used to link the regions) with at least two in each region. The 2005 ring list included a large number of items that were only available in rich countries. For example, Cameroon, Kenya, Senegal, Zambia and Sri Lanka enumerators had to price a 2003 or 2004 vintage bottle of Bordeaux, a front loading washing machine with a pre-specified spin speed, and a Peugeot 407 with air conditioning and climate control (Deaton and Aten, 2014, p. 18). Such items are - of course - likely to be rare and only bought by a small proportion of the population of these countries listed above, and cost relatively more in poor countries than in rich countries and thus can lead to an overstatement of the price level in poor countries relative to rich countries. In the ICP2011, in contrast, all countries had a list of priced items for comparison across countries. The net result is that the 2005 PPP round over stated consumption PPPs in Africa, Asia and Western Asia region by 20-30%, Deaton and Aten argue (2014, p. 6).

Inklaar and Rao (2014) concur with Deaton and Aten. They note that because some regions are LICs and MICs and others are only HICs, changes to the linking method can shift prices in LICs and MICs relative to HICs. Furthermore, Inklaar and Rao find, by constructing a counter-factual set of prices based on a harmonized measurement in both periods, that changes in the measurement methodology and price sampling between the 2005 and 2011 ICP survey can explain the substantial differences between the data. Furthermore, and 'broadly comforting' to researchers, as they put it, is that the use of the global core list of products from all countries in ICP2011 largely removed the biases of the ICP2005 (Inklaar and Rao, 2014, p. 32).

Ravallion (2014a), though, questions the Deaton and Aten (2014) and Inklaar and Rao (2014) thesis regarding the 'ring' countries on the basis that most of the variance in unexplained revisions are within regions, not between them. Instead, he argues that domestic

[2] ICP (2014a; 2014b) notes many if not all of such issues raised in these publications. For example, ICP (2014a, p. 21-23, 2014b, p167-170) highlights that PPPs are statistical constructs not precise estimates; that there are margins of error on PPPs as a result of sampling and non sampling errors and variability in price and economic structures between economies; and that national average prices may be problematic in the analysis of large economies with large rural areas and/or rural populations.

inflation rates account for a share of the PPP change because the ICP puts greater weight on more internationally comparable traded goods than do domestic price indices and that there is evidence of a 'dynamic Penn effect' whereby economic growth comes with higher prices as one might expect rising real wages beyond the Lewis 'turning point' at least when the rural surplus labour supply is exhausted (see Ravallion, 2010).

In terms of using 2005 or 2011 PPPs to estimate global poverty, the ICP (2014a; 2014b) itself notes in numerous places how PPPs are used for estimates of global poverty and notes how each round of new PPPs brings revisions to global poverty and how the new 2011PPPs will entail a new global poverty line (2014b, p. 170). The ICP reports themselves (2014a; 2014b) for the 2011 PPPs note that although there were attempts to measure prices paid by the poor and how they differed across economies there is no general agreement on how to do so and whether such differences matter so 'additional research will be necessary' (ICP, 2014a, p.24; ICP, 2014b, p. 170), noting that the consumption PPPs are generated by ICP2011 to match the national account estimates of consumption. And that the population around the poverty line – as is well known - have different consumption patterns to national averages (a higher proportion of total expenditure on food). So presumably, the additional research would be some adjustment of national PPPs to PPPs near a poverty line. That said even though one might assume that PPPs based on actual consumption near an absolute poverty line might change the poverty headcount, when Deaton and Dupriez (2011) constructed new PPPs for consumption near the poverty line using 2005 PPPs they found that there was little difference between PPPs for the consumption of the poor and PPPs based on national accounts using the ICP2005. Deaton and Dupriez explain why in hindsight this is unsurprising: since the PPP poverty line is (or was) pinned to poverty lines in the poorest countries, the use of poverty PPPs would only make a difference if the prices faced by the poor in one country were very different from the prices faced by the poor in another country (when measured at standard PPPs), which seems (and they note does turn out to be) unlikely.

To date, the World Bank has continued to use 2005PPPs for the global poverty estimates published in December 2014 for global poverty in 2011 (see World Bank, 2014). However, as noted, others have certainly sought to make some preliminary estimates using 2011PPPs for global poverty in 2010 (e.g. Chandy and Kharas, 2014; Dykstra et al., 2014) and for global inequality trends (Inklaar and Rao, 2014; Milanovic, 2014). Although World Development Indicators has been updated to 2011 PPPs for household final consumption expenditure (HFCE) and other economic indicators, the PPP$ country level poverty estimates in both WDI and Povcal continue to be derived from the 2005 PPP$.

In other areas related to global poverty and global inequality the 2011 PPPs are certainly superior to the 2005 PPP data collection. For example, efforts were made to ensure adequate cover of rural and urban areas to reduce urban bias and China, India and Indonesia all conducted nationwide surveys in rural and urban areas, the omission of which was a criticism in previous rounds with reference to poverty measurement.

One important issue is raised by Ravallion and Chen (2015) who are much more cautious about use of the ICP2011 noting that there have been long standing concerns the ICP underweights food, especially poor people's food shares (and further questions on India's PPP are raised in Ravallion, 2014b). Indeed, they find a sizeable gap between food shares in household surveys (2006-present; median 2011) and the food shares in the 2011 ICP, especially so at the lower end of the distribution. For example, the ICP2011 food share for India is 30% but national household data suggest that the actual share in household consumption is 52% for rural areas and 44% for urban areas in India. For the poorest quarter of countries the gap is an average of 11.3%. However, the gap for the other three quarters of countries is just 5.6% and is zero in most rich countries. Ravallion and Chen (2015) do note food shares may be over estimated in household surveys.

One final and important issue is highlighted by Deaton and Aten (2014, p. 15) who argue that there are 'large, but largely unrecognized', standard errors relating to uncertainty on how relative prices and consumption patterns differ across countries. They note, for example, that the standard errors are low (around 5%) for closely related countries such as the US and Canada or the US and Western Europe but standard errors are in the order of 20-30% for the US to India or US to China comparisons (p. 15) and very large for say Mali versus Indonesia or Ethiopia versus China. The implication of these errors, for poverty estimation purposes, is that it is important to recognise the potential sensitivity of poverty estimates to differences in PPP rates – or, to invert this, another way to approach the same issue in one's analysis is to recognise that when one assumes a given set of PPP rates, it is important also to reflect on the sensitivity of poverty estimates to different poverty line values (see later discussion).

In sum, the 2011 PPPs are by no means ideal but they are methodologically stronger than the 2005 PPPs which have been used extensively for estimating global poverty and inequality and – more importantly – the 2011 PPPs are the best price data currently available to make estimates of global poverty and inequality. Deaton and Aten (2014) are unambiguous that the 2011 round is 'superior' to the 2005 round and that the 2011 round contains many methodological improvements over the 2005 round. They argue that the 2011PPPs are 'the most accurate we have, and [we can] provide no ground for doubting them' (p. 27). It would thus seem reasonable to assume that Deaton's (2010, p. 31) comment on ICP2005 holds for ICP2011:

> PPPs for the poorer countries in Africa or in Asia may be good enough to support global poverty counts, at least provided the uncertainties are recognized. Probably the most urgent area for the poverty counts is not the ICP, but the improvement in the consistency and timeliness of household surveys, and the upgrading of national accounts.

Over the last decade the number of household surveys has certainly increased in frequency and a number of countries have upgraded their national accounts.

Furthermore, to reiterate, the various pre-2011 PPPs *have* been used for global poverty estimates for about twenty five years since the late 1980s, even though they are now recognised as inferior methodologically compared to the most recent 2011PPP rates. We would thus argue that, rather than focus on calling into question the 2011PPP rates, a better question to ask is under what conditions, or with what caveats, might it be reasonable to use the ICP2011 for global poverty and inequality estimates?

In view of the preceding discussion, we propose two conditions extending that of Deaton's citation above: first, that when estimates of global poverty (and inequality) are presented the inherent uncertainties are clearly recognized and discussed at the outset as we have done here; and second, that the estimates are not presented as single line estimates of global poverty but rather that a range of consumption lines are considered together up to perhaps $10 a day.

3. Model Construction

3a. Overview

In this section we outline the model we use to make estimates of global poverty and inequality to compare what difference the use of 2005 and 2011 PPPs makes. The Growth, Inequality and Poverty (GrIP) model is a custom built model discussed and originally developed in Edward (2006), and further discussed (and updated and expanded) in Edward and Sumner (2013a; 2013b; 2014). In summary, GrIP is a global model of consumption distribution built of data drawn from several datasets (see Table 1) with adjustments made for consistency. The principal datasets are: the World Bank's *Povcal*; *World Development Indicators* (henceforth, WDI); and the United Nations' World Institute of Development Economics (UNU-WIDER) World Income Inequality Database (henceforth, WIID). While the model makes best use of the relevant data in those sources we find that the limited and variable coverage in early years means that attempts to construct a global distribution prior to 1980 require an excessive degree of estimation and imputation to 'fill in' missing data for countries where survey or National Account (NA) data is missing. Lahoti *et al.,* (2014) propose various ways to do this and GrIP does include ways to make similar estimates.

However, in this paper, we have chosen not to go back further than 1990, notably because the 2011 PPP figures (in WDI) have been backdated but only to 1990. We therefore provide here analysis only from 1990, a start point that does however neatly cover a line in history, namely the end of the Cold War and the period of contemporary globalisation since that has played a role in shaping global economic development.

GrIP v2.0, as used for this paper, has been updated with the following data that became available in late 2014: the Povcal dataset updated on 8 Oct 2014 (which now includes a substantial amount of data for higher income countries that previously was sourced in GrIP 1.0 from Eurostat and other sources); the World Development Indicators (WDI) dataset updated on 17 Oct 2014 and the WIID3b dataset updated September 2014. In addition, for

forecasts beyond 2012 we use the IMF World Economic Outlook (WEO) Oct 2014 forecasts and the United Nations, Population Division's (UNPD) World Population Prospects (WPP) 2012 Revision (WPP). All data was downloaded between 2 November and 5 December 2014. In order to compare the current 2011 PPP rates in WDI with earlier 2005 PPP's (no longer available in WDI), and because Povcal still cites survey means in 2005 PPP$, we also use data for the earlier price rates taken from WDI Dec 2013 updated, downloaded in Feb 2014 shortly before release of the new 2011PPP rates. In building such a model there are a set of issues to be dealt with and we discuss them next before making estimates with both the 2005 and 2011 PPPs.

Table 1: Core components of the GrIP v2.0 model and data sources

Variables	Source and date of update
Survey distributions, survey means	PovcalNet, 8 Oct 2014
HFCE and GDP in 2011PPP, population headcounts, additional survey distributions	WDI, 17 Oct 2014
HFCE and GDP in 2005PPP	WDI, 18 Dec 2013
Additional survey distributions	WIID3b, Sept 2014
GDP growth forecasts	IMF World Economic Outlook (WEO), Oct 2014
Population growth forecasts	UNPD World Population Prospects (WPP) 2012 (medium forecast)

The core approach in the GrIP model is to take for each country the distribution data[3] and, by combining this with data on national population and on the mean consumption per capita in internationally comparable PPP $, develop for each country an estimate of how many people live at any specific consumption ($-a-day) level in 2005 or 2011 PPP. Having identified for each country the number of people living at a given consumption level, GrIP then aggregates these to build a global distribution. A wide variety of other aggregations are also readily produced; for example, by region or income category as shown in the various results presented below. These aggregations can then be interrogated to investigate issues such as poverty levels and trends in inequality and the distribution of the benefits of economic growth.

3b. Considerations in construction of the model

i. Combining distribution surveys with National Accounts data

To build a global consumption distribution it is necessary to determine (or estimate) for each included country a within-country distribution (that is, what percentage of total national consumption that is accounted for by different rank-ordered quantiles of the population) and how that consumption can be compared and aggregated between countries (that is, a

[3] We use published quintile and decile data disaggregated, as described later, into a range of smaller fractiles

statement of total national consumption in an internationally comparable currency such as PPP$). In GrIP, within-country distributions (quintile and upper and lower decile data) are taken, in order of preference, from survey data in Povcal, WDI or WIID. Where WIID is used, consumption distributions are used in preference to income distributions.

Internationally comparable national average (mean) consumption data can estimated from survey data or from NA measures (published in WDI). Povcal provides survey means (standardised as mean monthly consumption or income) but only for years in which surveys exist.[4] WDI, on the other hand, typically provides annual NA aggregates, most usefully, standardised total national Household Final Consumption Expenditure (HFCE) in 2011 PPP$ in the current WDI datasets and in 2005 PPP$ in earlier datasets. An extended debate exists about whether it is better to build a global distribution of consumption purely from survey data (see for discussion, Ravallion, 2003; Deaton, 2005), in which case the model fails to take account of information on changes in consumption in the HFCE yearly figures, or to combine survey distributions with NA totals, in which case the model fails to take account of wildly varying differences between consumption totals derived from survey means and HFCE figures from NA data collation – differences that call into question whether survey means really are the best way to measure changes in aggregate consumption (see data on NA/S ratios below and discussion and comparison on global poverty by NA and survey means in Edward and Sumner, 2014). There are arguments for and against each approach so GrIP incorporates various ways to combine survey and NA data, and so to allow comparisons of results under different assumptions. In this paper, however, our main concern is to compare the impact of the choice of 2005 PPP or 2011 PPP on estimates of global poverty using a survey mean based approach.

At the same time, in the interests of building a model that makes best use of available data, GrIP also takes account of the HFCE data in WDI as follows. First, for any country that has data in Povcal we calculate the NA-to-Survey (NA/S) ratio. For this study, that is the ratio of the HFCE aggregate in WDI in the survey year to the total national consumption derived from the survey mean in Povcal for the population of the country in the survey year, with all terms expressed in 2005 PPP$ since currently that is still the PPP$ used in Povcal.[5] As is well known NA/S ratios do not unfortunately show a very convincing systematic relationship

[4] WIID does also provide some survey means. However, in most cases in WIID the means are missing and where they are present they are often stated in diverse units that do not lend themselves readily to international comparisons. Where the means are present and clearly comparable and the surveys are considered to be of adequate quality, those surveys are usually already in PovcalNet. In cases where this is not the case we rely on the survey means in PovcalNet only.

5 Various NA measures are candidates as the source for the analysis: GDP or Household Final Consumption Expenditure (HFCE) being the most useful. In this paper all the figures are based on HFCE (in 2005 or 2011 PPP$ as stated). Because coverage of GDP data is generally better than that of HFCE data, where GDP data exists in WDI but HFCE data does not then the missing HFCE figure is estimated from the GDP data. Wherever possible this is done in a given year by applying the most recent HFCE/GDP ratio for the country in question. Where no such ratio exists then the average ratio calculated for all countries with suitable data in the same region and income category is used.

either across countries or even between surveys (See Ravallion, 2003). For example, the highest NA/S ratio is found in Turkmenistan in 1993 (NA/S=6.8 on a survey mean of $38 per person per month in 2005 PPP$) but by the time of the next survey in 1998 this had fallen rapidly (to NA/S=1.8 on a survey mean of $84 pppm). The lowest ratio is found in Moldova where the NA/S ratio was 0.5 in 1992 although it rose to 1.1 by 1997. Elsewhere a number of countries have had NA/S ratios below 1.0 throughout the period since 1990. These include: Congo, Dem. Rep.; Comoros; Bosnia and Herzegovina; Ethiopia; Guyana; Djibouti.[6] This is indicative of some of the significant difficulties encountered in the endeavour of making estimates of global poverty and inequality.

GrIP incorporates various ways to combine survey and NA data but because in this paper we wish to replicate the survey mean derived approach used in Povcal, throughout this paper GrIP calculates the relevant NA/S ratio (in this case the HFCE/Survey ratio) for every country/survey year instance and then estimates by interpolation the NA/S ratio for all years between surveys. For years since the most recent survey we use the latest NA/S ratio (that is, we do not extrapolate changes in NA/S ratios beyond the most recent survey because of the danger that trends in NA/S ratios have more to do with ad-hoc methodological differences between surveys than with fundamental trends in the ratio of actual 'like-for-like' household consumption to HFCE). This leaves the problem of countries where additional distribution data is available but there are no applicable Povcal means (fortunately a rather more limited number of cases than in earlier versions of GrIP since the recent Povcal update now includes many higher income countries). For these countries, wherever possible we use a NA/S estimate taken from the closest Povcal data if the country in question does have surveys. If there are no Povcal surveys for that country then we estimate the NA/S ratio from the HFCE value, by using the surveys in Povcal to derive a relationship with the form:

$$\frac{NA}{S} = (HFCE\ per\ capita)^{\alpha}$$

We derive this relationship using only consumption surveys in Povcal and this then enables us not only to bring in, with a treatment that is consistent across the years, countries for which distribution data exists but survey means are missing or unclear but also to develop estimates for countries where there are no survey data.[7]

ii. Disaggregating decile and quintile distribution data

6 Values less than 1.0 imply that survey consumption was higher than that reported for HFCE. Intuition is that because HFCE theoretically includes expenditure by others (governments and NGOs for example) on behalf of households HFCE would be expected to be higher than survey consumption. For fuller discussion of this issue see Anand and Segal (2008, p. 67) who argue that surveys are preferable to any NA category, but that if NA are to be used then HFCE is preferable to GDP.

7 We derive this by a log-log regression: $\log(NA/S) = \alpha \cdot \log(\text{HFCE per cap})$ which yields a value of $\alpha = 0.052$.

To develop a global distribution, GrIP calculates, from the decile/quintile distribution data and across an extensive range of standardised consumption levels, the number of people in each country at each consumption level. In earlier versions of GrIP this disaggregation was done using a method of linear estimation designed to ensure that decile and quintile totals were accurately replicated.

GrIP v2.0 has the facility to disaggregate distributions using either a linear method (as used in earlier versions of GrIP), or the Generalized Quadratic (GQ) and Beta Lorenz functions (see Datt, 1998).

As ever, there are strengths and weaknesses to different approaches. The linear approach works well at the lower end of the distribution but at the higher end of the distribution (typically the upper quintile: the highest consuming 20%) while it does accurately reproduce the totals of these top two deciles it does so at the expense of significant oversimplification of the large variations in inequality within those deciles. The GQ and Beta lorenz curve functions arguably replicate better (but still not perfectly) the inequality within these highest deciles. However because these curve functions are derived from regression estimates they tend to be most accurate in the centre of the distribution. At the tails (notably the poorest 10% and the richest 10%) the proportion of aggregate consumption allocated to the poorest and richest deciles can diverge significantly from the input values from which the curve functions have been derived (unlike the linear approach which is designed to replicate these input values accurately). This gives us particular cause for concern about the use of the GQ and Beta functions for poverty estimates, especially when the poverty headcount ratios are of the order of 15% or less.[8]

We therefore consider that GrIP's original linear estimation method is more appropriate than the GQ or Beta lorenz functions when assessing poverty levels. Except where we explicitly provide poverty-related estimates based on GQ or Beta functions for comparative purposes, throughout this paper poverty-related estimates (poverty headcounts, and poverty gaps) are derived from the linear estimation method. However, when looking at the global distribution across all consumption levels (from the world's poorest to the world's richest) we consider that despite their limitations the GQ and Beta functions are likely to be more representative of the distribution within the highest quintile – where in most instances 40%

[8] Although until very recently PovcalNet poverty estimates have been based on GQ and Beta lorenz functions, the PovcalNet website carries the following warning: 'PovcalNet was developed for the sole purpose of public replication of the World Bank's poverty measures for its widely used international poverty lines, including $1.25 a day and $2 a day. The methods built into PovcalNet are considered reliable for that purpose. However, we cannot be confident that the methods work well for other purposes, including tracing out the entire distribution of income. We would especially warn that estimates of the densities near the bottom and top tails of the distribution could be quite unreliable, and no attempt has been made by the Bank's staff to validate the tool for such purposes'. Furthermore, whereas in the past the datasheets of supporting detail in PovcalNet would estimate GQ and Beta parameters from which the decile and quintile data in both PovcalNet and WDI were then calculated, in the most recent additions to PovcalNet the World Bank seems to have changed its approach and now provides percentile data without any reference to underlying reliance on the GQ or Beta lorenz method.

or more of national consumption occurs. Therefore, unless explicitly stated otherwise, in this paper analysis that covers the full range of global consumption (in density curves, growth incidence curves, and ginis) is derived from the GQ and Beta lorenz functions. Where these functions are used the function adopted (GQ or Beta) in each case (country and year) is the one that is the best-fit, using a least squares test, to the input decile/quintile data (in most, but not all, cases this turns out to be the GQ function).[9]

iii. Extending data to global coverage

Consumption (or income in some cases) surveys do not take place annually so in the GrIP model distributions for intermediate years, between surveys, estimates are calculated by interpolation, while in years subsequent to the most recent survey, or prior to the earliest survey, the distribution is assumed to remain unchanged from that survey.[10] Where a country has no usable surveys, or the gaps between surveys are too great to allow reliable interpolation,[11] the GrIP model can 'fill' a country's missing distributions with a distribution estimated from other similar countries. This means that the analysis can either be 'filled' to more closely replicate global population and consumption totals, or 'not filled' to include only the smaller set of countries for which national distribution data is available.[12] The GrIP model fills missing distribution data by taking estimates from averages (not population weighted) for the year in question for other countries in the same region and income category, or if there is insufficient data for that then by taking estimates from averages for all other countries in the same income category.[13] For these countries we also estimate an appropriate survey-equivalent consumption using the NA/S-to-HFCE relationship described above.

This means that in GrIP there are two main processes used to supplement the Povcal data so as to increase the coverage of countries into a truly global distribution. First, where additional usable distributions are available from other sources (WDI and WIID) they are added in and survey equivalent means are estimated using a NA/S estimate taken from the closest Povcal data if the country in question does have surveys in Povcal and otherwise

[9] Tests are also carried out to ensure that the functions are actually valid lorenz functions – that is, to check that consumption levels increase as one moves up the distribution curve. Despite the fact that the regression analysis is based on a function for which in theory this should automatically be the case it is not always so.

[10] See Dang et al., (2014) for discussion of such issues.

[11] In this paper we assume that a survey is usable for interpolation if it took place within 12 years of the year in question. If no interpolation is possible then a survey is considered usable if it took place within 7 years of the year is question, in which case the distribution is used unadjusted but means are adjusted in line with changes in HFCE.

[12] PovcalNet only uses distributions where the population unit is the individual, not household. WDI reproduces PovcalNet distributions and, in the case of data not in PovcalNet, World Bank staff have (as stated in the notes to WDI) made an effort to ensure that the data are as comparable as possible. For this reason we consider that the distributions in GrIP are already as well aligned as possible to the individual rather than the household.

[13] Income categories and regions are the same as those used in the current WDI. Where a region/income category has no other countries in the same income category with usable distribution data then the assumed distribution is the average for all countries globally in the same income category.

estimated from the NA/S-to-HFCE relationship. Second, where a country has no usable distribution an approximate distribution is estimated from regional and income category averages and combined with an appropriate estimate, derived from NA data and global relationships, of average consumption. Despite the uncertainties involved in these methods we consider that this is a more justifiable approach, both for estimating poverty and for considering global inequality, than alternatives where either the non-Povcal countries are simply omitted or it is assumed that regional poverty figures can be estimated by scaling up pro-rata for missing populations (an approach that can be bold in regions such as sub-Saharan Africa where the Povcal data includes only 73% of the total population).

These two processes enable us not only to produce an analysis that closely resembles the survey-based methodology of Povcal but also to extend that analysis to build a global consumption distribution. The extent of coverage of the GrIP analysis, and the impact of the various stages in extending this coverage is summarised in Table 2 and illustrates how GrIP represents a global model of consumption distribution incorporating over 96% of the global population. Process 2 figures for HFCE coverage exceed 100% because the WDI 2011PPP figure for global total Household Final Consumption Expenditure (HFCE) is actually slightly lower than the sum of the HFCE figures for the individual countries. Nevertheless the table demonstrates that GrIP effectively provides close to total coverage of global population and consumption.

Table 2: Coverage of population and HFCE in GrIP v2.0 before and after filling by 2011 and 2005 PPP

	2011PPP			2005PPP		
	No. of countries	**Population**	**HFCE**	**No. of countries**	**Population**	**HFCE**
PovcalNet coverage						
1990	110	88.1	82.5	110	88.1	81.1
2012	111	86.9	77.3	109	85.8	73.4
Process 1: additional distributions from WDI and WIID						
1990	130	94.0	97.3	128	93.8	96.9
2012	145	94.6	96.5	143	93.5	94.6
Process 2: Filled with estimates for countries with no survey						
1990	175	96.8	100.6	169	96.4	99.0
2012	192	98.1	100.8	180	96.5	98.0

Source: GrIP v2.0.

Of course outputs from any such model can only ever be best-estimates based on the judicious use of the at times limited and frequently highly variable data sources. Some testing of sensitivity to different assumptions is therefore called for. One feature of GrIP is that it has been developed to allow ready comparison of different assumptions. One key comparison is between analyses using survey-based means (as used for Povcal and in World Bank poverty estimates) or those that apply survey distributions to NA data directly. Such comparisons were first made in the early-to-mid 2000s by Deaton (2005), Ravallion, (2003) and Sala-i-Martin (2002). More recently, Edward and Sumner (2014) used GrIP v1.0 with

2005PPP data to highlight the importance of adjusting poverty lines to take account of systemic differences between survey and NA data and to demonstrate how these different approaches lead to substantially differing views on the geography (meaning location) and scale of global poverty. In this paper we only use the survey-based approach. We do not revisit the survey-vs-NA difference because our focus in this paper is on the impact of the new 2011 PPP data on poverty estimates derived from survey means as that is the approach used in Povcal.

4. Methodological Contentions

4a. The Raw Data

There are several issues arising from the quality and variety of the underlying raw survey data that cannot readily be adjusted for in the model. We have already discussed some of the difficulties in disaggregating decile and quintile distribution data and in relating survey means to NA data. The wide variance in NA/S ratios may well arise because national distribution data is derived from surveys that vary in their approach between countries and over time (although increasingly improvements are being made to standardise these surveys). For example, distribution surveys may be based either on income or consumption (see earlier discussion). They may be produced either for individuals or for households and income surveys may be gross (pre-tax) or net (post-tax). In theory these differences should be adjusted for but in practice the variances are so large and the size of the datasets so limited that it is currently difficult to make reliable adjustments.

The problem is compounded because even when survey methods seem to be similar the results can still show considerable variation between surveys so that the comparability of the surveys can also be questionable. For example, according to surveys the consumption share of the poorest 10% in Uganda rose from 1.9% in 1989 to 3.2% in 1996 before dropping again to 2.4% in 1999. It is hard to believe that such wide and rapid variations really do reflect sudden changes in actual distributions. More likely they arise in large part from the inherent variability between surveys and/or from changes to survey techniques and instruments. Unfortunately there is no way to adjust for these uncertainties, nor to know which surveys are the more 'reliable', so analysis is compelled (as with all other estimates of global poverty and inequality) to rely on the published survey data. Confronted with such variability it becomes difficult, and potentially largely spurious, to try to identify relationships in the survey data that might support robust adjustments for detailed differences in survey approach. Instead we largely follow standard practice of noting these differences without attempting to adjust for them.

ii. Adjusting for differences between consumption and income based surveys

We do adjust for the likely significant difference between surveys that are consumption based and those that are income based. There is likely to be a systematic difference between such surveys but in the past many analyses of global poverty inequality, including earlier

versions of GrIP, have not made any adjustment (e.g. Edward and Sumner, 2014).. The main reason for this was that within Povcal there is only a rather limited set of countries with both income and consumption surveys that could be used to develop a comparison method to adjust for the income-consumption survey difference, so the adjustment was considered to be rather speculative. In the current version of GrIP (v2.0) we are now able to introduce this adjustment. This has become more feasible with the latest update of WIID which contains a much larger number of comparable income and consumption surveys.

The seminal paper of Deininger and Squire (1996) developed adjustments for consumption to income measures.[14] More recently, and using the latest WIID, Lahoti et al (2014) identify 120 instances in the WIID dataset where there is both a consumption and an income survey reported by the same statistical agency in the same year for a country. From these they estimate conversion factors to transform quintile data from income surveys to consumption-equivalent values. We have not repeated their calculations instead we have used the more limited set of Povcal surveys to develop comparable estimates (see Table 3).

Table 3: Conversion factors for adjusting income survey data

	Estimate 'a' Source: PovcalNet	Estimate 'b' Source: PovcalNet	Estimate 'c' Source: Lahoti et al., (2014)
No. of matched surveys in sample	25	39	120
No. of countries in sample	8	15	Not stated
Decile 1 (D1)	1.399	1.598	1.386 *
Quintile 1 (Q1)	1.196	1.318	1.185
Quintile 2 (Q2)	1.045	1.091	1.150
Quintile 3 (Q3)	1.030	1.048	1.120
Quintile 4 (Q4)	1.014	1.011	1.060
Quintile 5 (Q5)	0.966	0.936	0.860
Decile 10 (D10)	0.955	0.919	0.851 *

Sources: GrIP v2.0 and Lahoti et al., (2014); Note: * = data estimated by authors

In table 3, estimate 'a' is where income and consumption surveys are in the same year. Estimate 'b' is where an income survey exists within one year of the consumption survey. Despite using a much more limited dataset, these estimates broadly confirm Lahoti et al.'s figures and demonstrate that as one would expect consumption distributions are less unequal with a higher proportion of the distribution accruing to the lower fractiles. In this paper we thus have adopted Lahoti et al.'s adjustments (because they use a much larger dataset) and

[14] They developed adjustments for Q1 to Q5 and suggested adjusting Gini coefficients by 6.6 to make consumption Ginis comparable with income Ginis. More recently Niño-Zarazúa et al., (2014, p.11) suggest adding 7.8 points to the consumption Gini though 6.6 lies within the 95 per cent confidence interval of their estimate of 7.8 they note. They also run a similar exercise to adjust consumption quantile shares to income quantile shares.

supplemented them by our own estimate (derived from estimates 'a' and 'b') for the lowest and highest deciles as these are not stated by Lahoti et al. We would note though that a substantial degree of uncertainty remains over this relationship (see discussion in Atkinson and Brandolini, 2001).

It is not sufficient however merely to adjust the fractile estimates. An adjustment also needs to be made to reduce the income aggregate to render it comparable to consumption aggregates (the reason being some income, particularly for those in the higher fractiles, becomes savings rather than consumption). Our approach to this problem is to return to the calculation of the NA/S-to-HFCE relationship (discussed above) but this time calculate the NA/S-to-HFCE ratio using only income surveys (whereas previously it was calculated using only consumption surveys). This allows us to use all the surveys in Povcal (of which over 500 are income based and over 600 are consumption based as opposed to the much more limited set of fewer than 40 matched income and consumption surveys) to estimate a relationship between consumption and income based NA/S ratios as follows:[15]

$$\left(\frac{NA}{S}\right)_{consumption} = \left(\frac{NA}{S}\right)_{income} \times (HFCE\ per\ capita)^{\beta}$$

All results presented in this paper include this adjustment of income surveys to consumption equivalents.

iii. Adjustment for 'top incomes'

A further issue is that of the highest earners in a society, often labeled as an adjustment for 'top incomes' data. It is widely recognised that the share of the distribution that accrues to the top percentiles can be substantial judging by data from the Paris School of Economics' *Top Incomes Project* (which is based on taxation data). It is also recognised that the top of the distribution is not well captured in the household survey data (see for discussion, Korinek et al., 2006). At least two methods have been proposed recently to take account of this. Some scholars have attempted to adjust for 'top incomes' by assuming that discrepancies between survey and national account (NA) data are entirely due to underreporting by the richest (e.g. Lakner and Milanovic, 2013). Others develop assumptions on the missing 'top incomes' by drawing on the work of Thomas Piketty and Tony Atkinson and others on top incomes based on tax data (e.g. Anand and Segal, 2014).

We discuss these approaches below while noting that there is also a further issue of untaxed income or illicit financial flows that also ought to be taken into account but has not yet been attempted (neither in GrIP nor in other similar models) because it remains difficult to quantify.

[15] See discussion in Deaton (2005) who analyses the issue in detail. We estimate the factor β = -0.024.

The first method of adjustment is that of Lakner and Milanovic (2013). This approach assumes that the difference between NA means and survey means goes to the top 10% and then they uss a Pareto distribution to allocate that sum across the top 10%. The main issue with such an approach is that it assumes that all the difference between survey and NA means is due to under reporting by the rich. That is an important assumption, not least because the NA consumption figures are calculated as a residual (ie a difference between other figures) (see Anand and Segal, 2008, p. 69) so that measurement errors elsewhere in the national accounts may have a significant influence here. This is supported also by the observation that in some cases/countries the NA consumption figures are actually lower than survey means - a situation that rather undermines the logic that the national accounts HFCE vs. survey mean difference is simply due to underreporting by the richest. Furthermore, the justification for allocating the difference to the top 10% is open to question. Lakner and Milanovic recognise (2013, p. 15) these issues and caution that their 'estimates should be seen as an approximate first step'. Certainly one can have sympathy for the approach on the basis that it is a valiant attempt to approach a difficult issue. It does though raise further questions about the cause and allocation of the NA to survey mean difference.

Alternatively, Anand and Segal (2014) use a different, and more plausible, method by assuming that very rich households are simply excluded from surveys in order to incorporate top income data into their survey distributions:

> *We assume that the survey data in the Milanovic dataset represent only the bottom 99% of the population in each country. Accordingly we multiply the population in each income group in the surveys by 0.99, and append the top percentile with its income share from the tax data (assuming that its share of 'control' income is equal to its share of survey income). The exclusion of the top percentile implies that mean income in the surveys is underestimated, and our procedure results in a corresponding increase in mean income for each country* (p. 20).

This is an interesting approach since it combines the poverty survey means measures of incomes from tax data, rather than relying on the difference between survey means and NAs as an imputation of 'missing' top incomes. It does, however, require one to combine consumption and income (tax) data while the choice of the top 1% is a convenient assumption - because if one took it down to say the top 10% ('top incomes' data is currently available from the *Top Incomes Project* for the top 10%, 5%, 1%, 0.5%, 0.1% and 0.01%) then the estimation technique would need to be more complicated to allow for inequality across the top 10% (such as Lakner and Milanovic's use of a Pareto distribution to allocate 'missing' consumption across the top 10%). Furthermore, data on top incomes is only available for 30 countries, of which Anand and Segal found that only 18 to 23 had applicable data for any individual year in their analysis.[16] This raises the issue of how to extrapolate that data to the complete set of countries in the dataset. To do this, Anand and Segal estimate a

[16] See: http://topincomes.parisschoolofeconomics.eu/#Database:

relationship between the share of the top 10% and the survey mean in the national survey distribution and that of the top 1% in the income tax data - effectively implying that the share of the top 1% can be predicted from the survey data.

Our conclusion from reviewing these approaches is that, for the purposes of this paper, with its focus largely on global poverty estimates and the impact of the PPP rate changes, the existing approaches to the top incomes issue are rather speculative so we do not include here any adjustment for 'missing' top incomes. In any event, the issue does not affect consideration of global poverty counts because the 'missing' consumption is assumed to occur only at the top of the distribution well above the poverty lines we consider. It does, of course, impact on global inequality estimates. The inequality estimates in this paper therefore reflect only the values derived from surveys and PPP rates. While this may be a reasonable basis for estimating overall trends in inequality it should be recognised that if the consumption of the 'missing' top income earners' was (somehow) included the absolute inequality values would be higher.

5. New Estimates of Global Poverty and Inequality: How Much Difference Does the Choice of Price Data Make?

5a. How Do GDP and Consumption Differ by Price Data Taken?

A point of departure in the consideration of the impact of different price data is to ask what impact does it make to use 2005 PPP or 2011 PPP in terms of levels and location of consumption and output? As illustration, if one takes the 2011 PPPs, the USA is the largest economy (GDP = $16.0 trillion in 2012 in 2011 PPP) and China the second largest (GDP = $14.5 trillion in 2012 in 2011 PPP). The new PPP rates have significantly narrowed the gap between these two countries. China's GDP is 91% of USA GDP using 2011 PPP, whereas it was 76% using 2005 PPP data. India is the world's third largest economy using 2011 PPP (GDP = $6.2 trillion) or 39% of USA by 2011PPP versus 29% using 2005 PPP data. One of the biggest changes is to Indonesia (GDP = $2.2 trillion by 2011 PPP) whose economic size more than doubles if one uses 2011PPP versus 2005 PPP, lifting it from 15th largest to 10th largest economy in the world.

At a global level, world GDP (in 2012) can be re-estimated from $73 trillion (2005 PPP) to $96 trillion (2011 PPP) and household final consumption expenditure (HFCE) from $39 trillion (2005 PPP) to $50 trillion (2011 PPP) (see Table 4). What this means is that since the end of the Cold War (1990 to 2012) rather than $37 trillion of new GDP generated (in 2005 PPP) the figure is $50 trillion new GDP (in 2011PPP). In percentage terms, and irrespective of whether we use 2011 PPP or 2005 PPP or whether we consider GDP or HFCE, the size of the global economy doubled between 1990 and 2012 (in all these cases 1990 values are

between 49% and 52% of 2012 values). Global growth is slightly higher with the new set of PPPs because of the higher weight of faster-growing developing economies.

Table 4: Survey, HFCE and GDP totals ($ billions), 2011 PPP and 2005 PPP

	Survey	GDP			HFCE		
	Countries in GrIP	Countries in GrIP	Global total	GrIP coverage	Countries in GrIP	Global total	GrIP coverage
2011PPP							
1990	16,785	45,083	46,159	97.7%	24,396	24,251	100.6%
2012	31,450	94,314	95,825	98.4%	50,347	49,939	100.8%
Change	14,664	49,232	49,666		25,951	25,687	
Change (as % of 2012)	*46.6*	*52.2%*	*51.8%*		*51.5%*	*51.4%*	
2005PPP							
1990	13,349	35,537	36,270	98.0%	19,446	19,633	99.0%
2012	23,686	71,031	73,251	97.0%	38,046	38,824	98.0%
Change	10,338	35,494	36,981		18,600	19,190	
Change (as % of 2012)	*43.6*	*50.0%*	*50.5%*		*48.9%*	*49.4%*	

Source: GrIP v2.0

These figures are all for National Account totals. Of significance to global poverty estimates is what has happened to global consumption when measured by survey means (or, when there is no survey and as described earlier, by NA figures adjusted to align to survey means). Here we find that, for the countries included in GrIP v2.0, consumption by survey means rises from $17 trillion in 1990 to $31 trillion in 2012 in 2011 PPP (versus $13 trillion and $24 trillion respectively in 2005 PPP). Survey data therefore indicates that global consumption grew by $15 trillion, or 46% (versus $10 trillion or 44% by 2005 PPP) which is rather slower than the NA growth rates but nevertheless it is $5 trillion more consumption than previously thought. This is substantially more than if the 2005 $ were simply inflated to 2011 $ which, for example, for survey consumption could inflate $10.3 trillion of growth to $11.9 trillion whereas the 2011 PPP changes increased this figure by approximately $2.8 trillion ($14.7 minus $11.9) or just over 20%.

At recent rates (2010-2012), taking 2011 PPPs, global consumption is growing at just over $1 trillion a year (survey mean) and that growth in consumption is accounted for largely by China (640bn or 28% of the growth). The other major countries showing survey consumption growth are the USA and India (250bn and 220bn respectively – meaning that with China they account for 50% of the global consumption growth). Russia, Brazil, Indonesia and Saudi Arabia are next on the list and together with China, USA and India account for just over two-thirds of global survey consumption growth.

Table 5: Household final consumption expenditure, 2012, 2005PPP versus 2011PPP

		Change 2011PPP to 2005PPP (%)	HFCE ($ billions)		
			In 2011PPP	2005PPP inflated to 2011PPP	In 2005PPP
World		14.0	49,939	43,807	38,824
Regions					
East Asia and Pacific (EAP)		24.5	12,250	9,839	8,720
Europe and Central Asia (ECA)		4.0	12,423	11,941	10,582
Latin America & Caribbean (LAC)		15.9	5,062	4,369	3,872
Middle East & North Africa (MNA)		48.0	2,791	1,886	1,671
North America (NAM)		-0.4	11,726	11,773	10,434
South Asia Region (SAR)		44.0	4,668	3,242	2,873
Sub-Saharan Africa (SSA)		63.2	1,718	1,053	933
E Asia excl. China		24.5	12,231	9,825	8,708
S Asia excl. India		44.0	4,668	3,242	2,873
Income category					
All High		2.6	28,009	27,309	24,202
Upper middle		25.7	13,213	10,513	9,317
Lower middle		52.8	8,567	5,608	4,970
Low		38.5	976	705	624
Population 100m or more					
2012 population. (millions)					
China	1,351	33.4	4,950	3,711	3,289
India	1,237	39.2	3,605	2,591	2,296
United States	314	0.0	10,945	10,945	9,700
Indonesia	247	57.1	1,043	664	588
Brazil	199	18.4	1,555	1,313	1,164
Pakistan	179	86.4	618	332	294
Nigeria	169	216.4	526	166	147
Bangladesh	155	43.0	251	176	156
Russia	143	20.1	1,750	1,457	1,291
Japan	128	2.4	2,498	2,438	2,161
Mexico	121	-0.3	1,126	1,130	1,001
Philippines	97	50.6	403	267	237

Source: GrIP v2.0 Note: To maximise consistency with WDI HFCE data, the inflator used is the value implicit in the USA HFCE data in WDI. This is slightly less than the inflator that would be estimated from US CPI for the same period (1.128 compared to 1.152).

In terms of specific and populous countries that matter either to global poverty or global inequality estimates, a number of developing countries saw substantial adjustments to their HFCE as a result of the PPP revisions (See table 5 for the twelve countries with population of more than 100m people).[17] The upward revisions particularly affect low income and lower

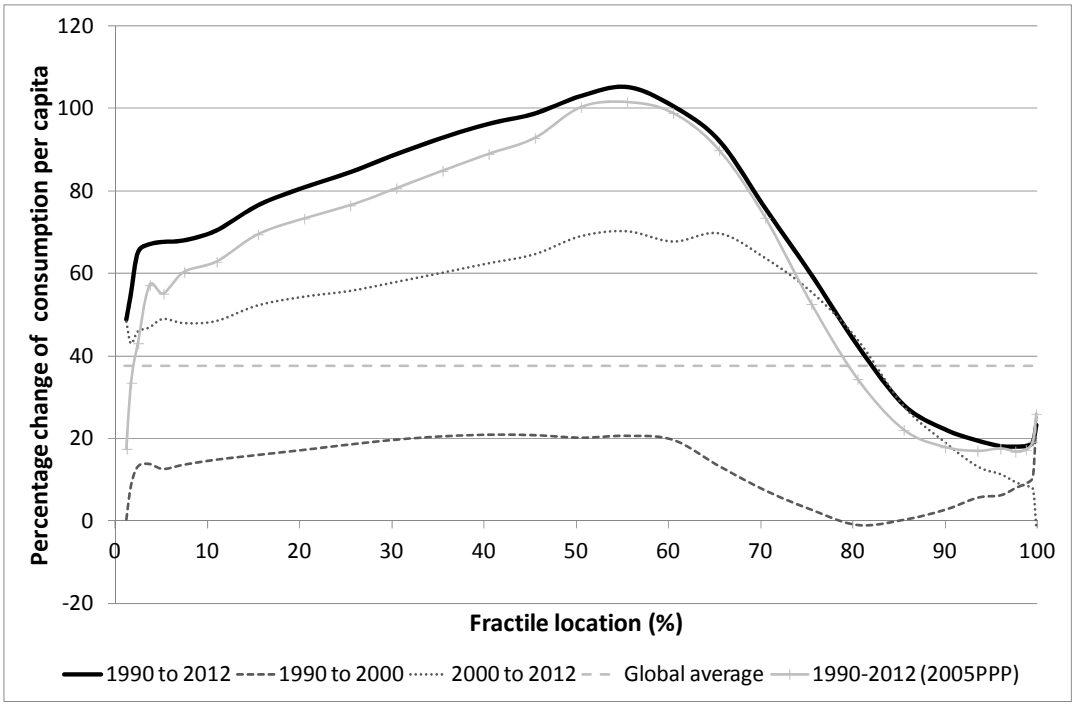
[17] HFCE, rather than GDP, figures are provided because these changes are the ones that directly affect the GrIP model. In one case (Tanzania, since 2011) the old HFCE 2005PPP figures in WDI are so different, both to previous years and to the equivalent published values now stated in 2011PPP, that they are considered unreliable.

middle income sub-Saharan Africa (although the sub-Saharan Africa figure needs some caution as the HFCE percentage increase of 63% reduces to 34% if Nigeria is taken out). In terms of developing countries and of substantial importance to global poverty and global inequality estimates, China, India, Indonesia, Nigeria and Pakistan all had large PPP revisions the effect of which is to reduce estimated poverty levels at any given poverty line taken.

5b. How Does Global Inequality Differ by Price Data Taken?

Next we can consider who benefited and by how much from global growth since 1990 and how much difference use of 2005 or 2011 PPP makes. In terms of the global growth incidence curve for 1990-2012, Figure 1 presents the distribution of benefits using 2005 PPP and 2011 PPP (respectively $10 trillion or $15 trillion of new consumption generated between 1990 and 2012.

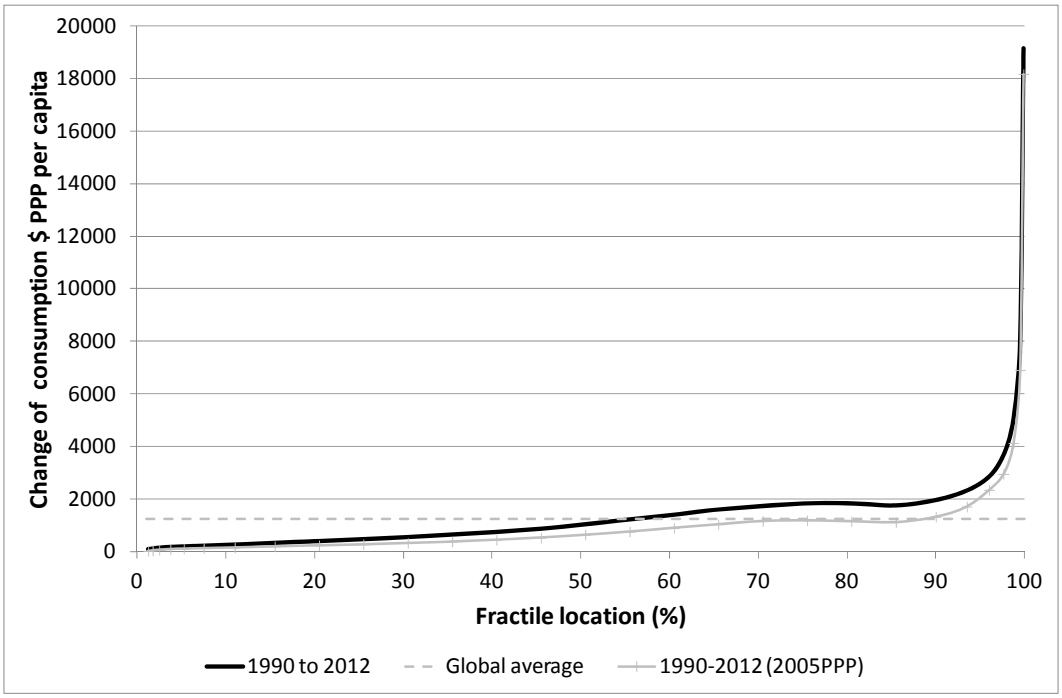
Figure 1: Relative benefits: Global growth incidence curve, survey means, 1990-2012 (2011PPP unless stated)



Source: GrIP v2.0.

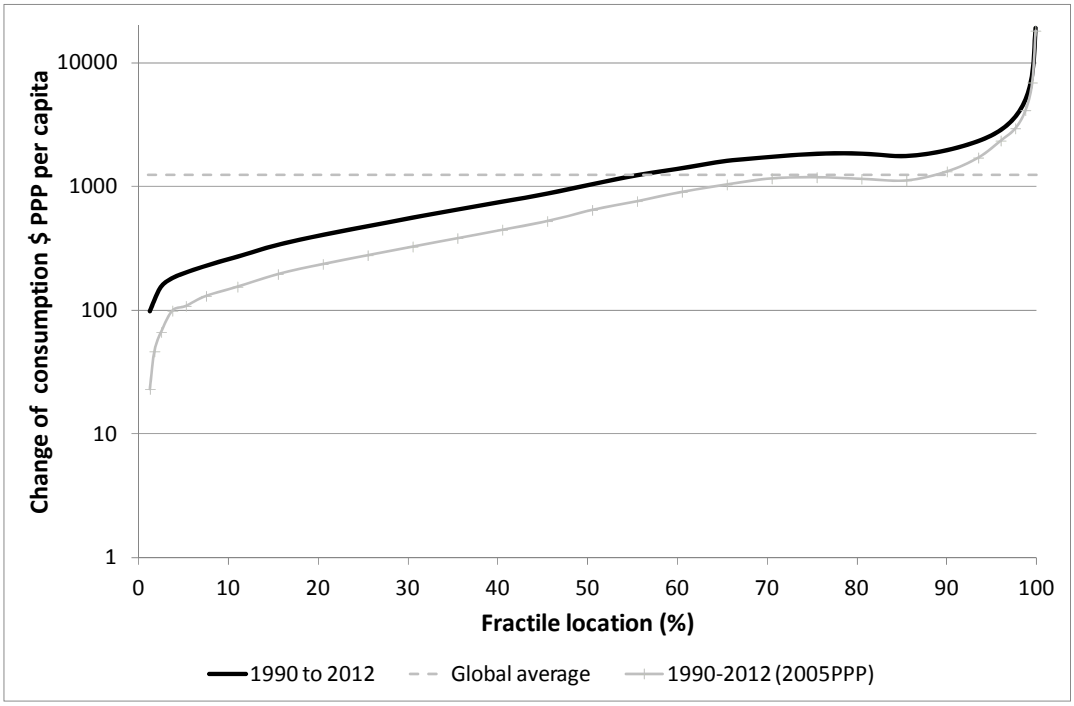
Recent 2011PPP seems more reliable so the old 2005PPP figures have been adjusted manually based on growth rates since 2010 derived from the 2011PPP data.

Figure 2a. Absolute benefits: Global growth incidence curve, survey means, 1990-2012 (2011PPP unless stated, linear scale)



Source: GrIP v2.0.

Figure 2b . Absolute benefits: Global growth incidence curve, survey means, 1990-2012 (2011PPP unless stated, log scale)



Source: GrIP v2.0.

Several points are noteworthy. First, if one compares the entire 1990-2012 period, our estimates of the distribution of benefits of economic growth differ relatively little whether one uses 2005PPPs or 2011PPPs: in the poorest half of the global population, the curve rises slightly – perhaps in the order of 10% if one uses 2011PPPs rather than 2005PPPs. This might sound significant but in absolute terms it is small (see Figure 2). Second, what is noticeable in Figure 1 is that, regardless of the PPP rates used, in the 1990s, as globalization took off, the global upper middle (70-90 percentile) saw their consumption per capita stagnate, and maybe even decline slightly, before recovering somewhat in the 2000s.[18] In short, one might say that the (relative) winners and losers of global growth were different in the 1990s and 2000s (a point noted for 2005 PPPs by Lakner and Milanovic, 2013, p. 31).

Next, we consider what the PPP change meant for three concepts of global inequality (see Figures 3 and 4) as measured by the Gini coefficient. First, global within-country inequality. Within-country inequality Gini coefficients are independent of international comparator rates so are not affected by changes in PPP rates.[19] Second, global between country inequality. Third, inequality based on all the individuals in the world. The 2011PPP rates resulted in a reduction in estimates of global inequality across the period due in large part to the increase (relative to the 2005PPP rates) in aggregate consumption of many of the larger developing and emerging economies (cf. Table 5). At a regional level too there are some major distribution changes (see Table 6). Some of the regional between-country Ginis change significantly. For example, the Gini for inequality between countries in sub-Saharan Africa changes from 0.387 in 2005 PPP to 0.299 in 2011 PPP.

However, although one might say that global inequality is lower than previously thought using 2011PPP (compared to 2005PPP) data, it is also the case that the change is not that large. In 2012, global inequality between individuals, measured by the Gini coefficient (see annex table A3) was 0.61 using 2011PPP (or 0.63 excluding China) rather than 0.65 using 2005PPP (or 0.68 excluding China) and global inequality between countries was 0.49 using 2011PPP (or 0.52 excluding China) rather than 0.56 using 2005PPP (0.58 excluding China).

To put these into some kind of context, a Gini coefficient of 0.61 (2011PPP) for global inequality between individuals in 2012 is close to the inequality level of South Africa in 2012 and a Gini coefficient of 0.49 for global inequality between countries is close to inequality in Brazil in 2012. In short, global inequality between individuals is about the same as inequality in South Africa and global inequality between countries is about the same as inequality within Brazil.

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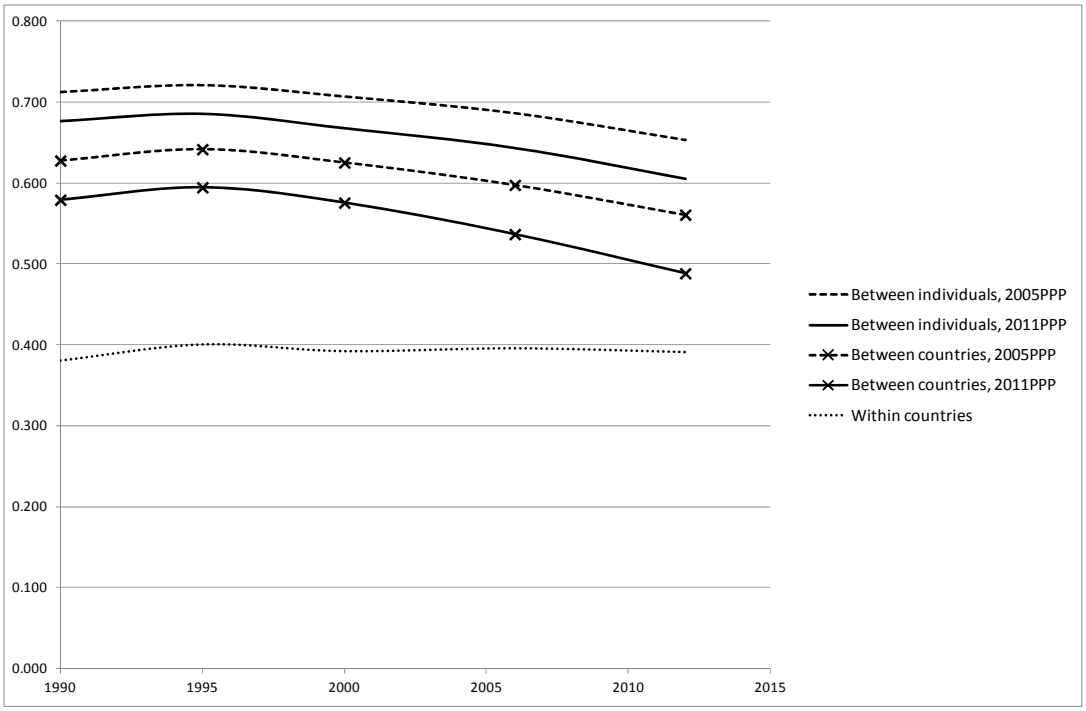
[18] Milanovic (2012, p. 13) and Lakner and Milanovic (2013, p. 31) present a global growth incidence curve. The primary difference to Figure 1 is that over the 20 year period of 1988-2008 they show no real growth in consumption at the 80th percentile. GrIP also identifies this region as the area of lowest growth for the period from 1990 to 2000 but estimates that this stagnation did not continue in the period from 2000 to 2012. .

[19] This would not be the case for the within-country component of the Theil T, because that is an *income*-weighted average of within-country inequalities.

We estimate more of a decline than earlier estimates (see Anand and Segal, 2008) based on all surveys currently available. However, the fall in global inequality from 1990-2012 almost evaporates once China is removed from global inequality estimates: global inequality excluding China between individuals fell from 0.66 to 0.63 (2011PPP) or 0.69 to 0.68 (2005PPP). And global inequality between countries excluding China fell from 0.54 to 0.52 (2011PPP) or 0.60 to 0.58 (2005PPP). This point about China and global inequality has been made previously by various scholars and most recently Niño-Zarazúa et al., (2014) who provide a detailed discussion on the impact of China and India on global inequality.

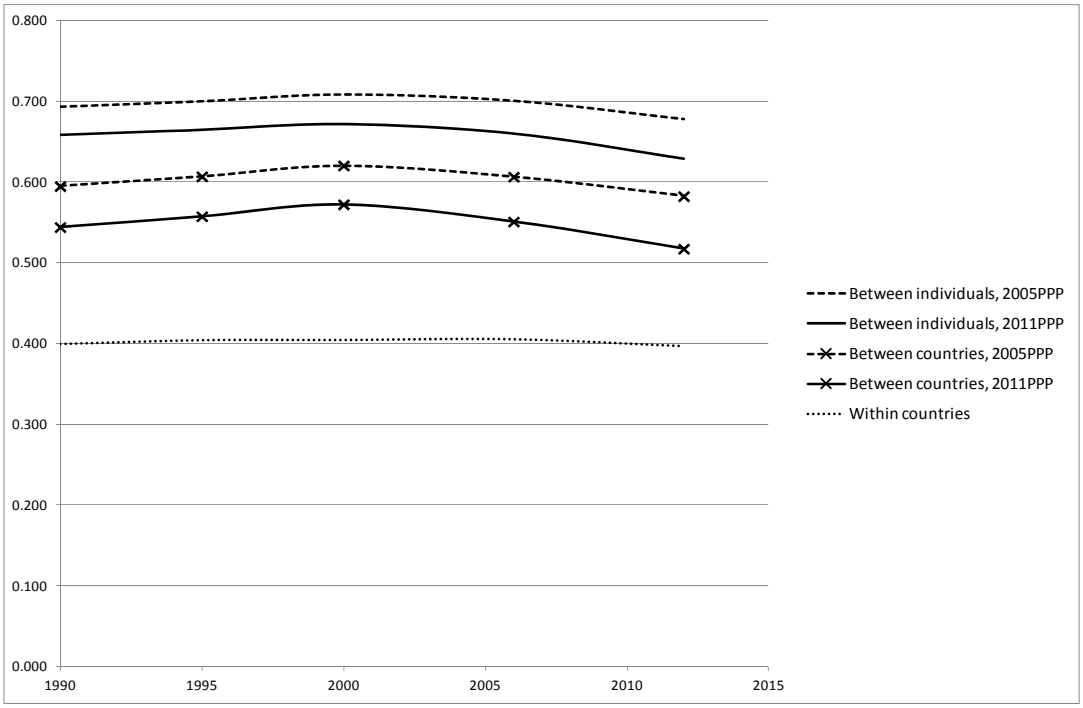
In sum, the choice of PPPs used makes some difference but not a great deal. The levels of global inequality are high and trends without China show global inequality is barely falling between 1990 and 2012 whether 2005 PPP or 2011 PPPs are used. Also notable, although not impacted by PPP changes, is just how little global inequality measured as aggregate within country inequality has changed between 1990 and 2012 (irrespective of whether China is included or excluded).

Figure 3: Effect of PPP rates on evolution of global Ginis



Source: GrIP v2.0.

Figure 4: Effect of PPP rates on evolution of global Ginis (excluding China)



Source: GrIP v2.0.

Table 6: Estimates of regional Gini coefficients, 2012 by 2005 and 2011PPP

	Between individuals		Between countries		Within countries
	2005 PPPs	2011 PPPs	2005 PPPs	2011 PPPs	
East Asia and Pacific	0.552	0.515	0.419	0.354	0.380
EAP excl. China	0.629	0.578	0.510	0.446	0.394
Europe and Central Asia	0.459	0.440	0.284	0.247	0.362
Latin America and Caribbean	0.530	0.529	0.130	0.122	0.515
Middle East and North Africa	0.485	0.441	0.331	0.270	0.347
North America	0.466	0.467	0.010	0.010	0.466
South Asia Region	0.355	0.363	0.080	0.112	0.342
SAR excl. India	0.344	0.361	0.126	0.176	0.312
Sub-saharan Africa	0.567	0.523	0.387	0.299	0.431

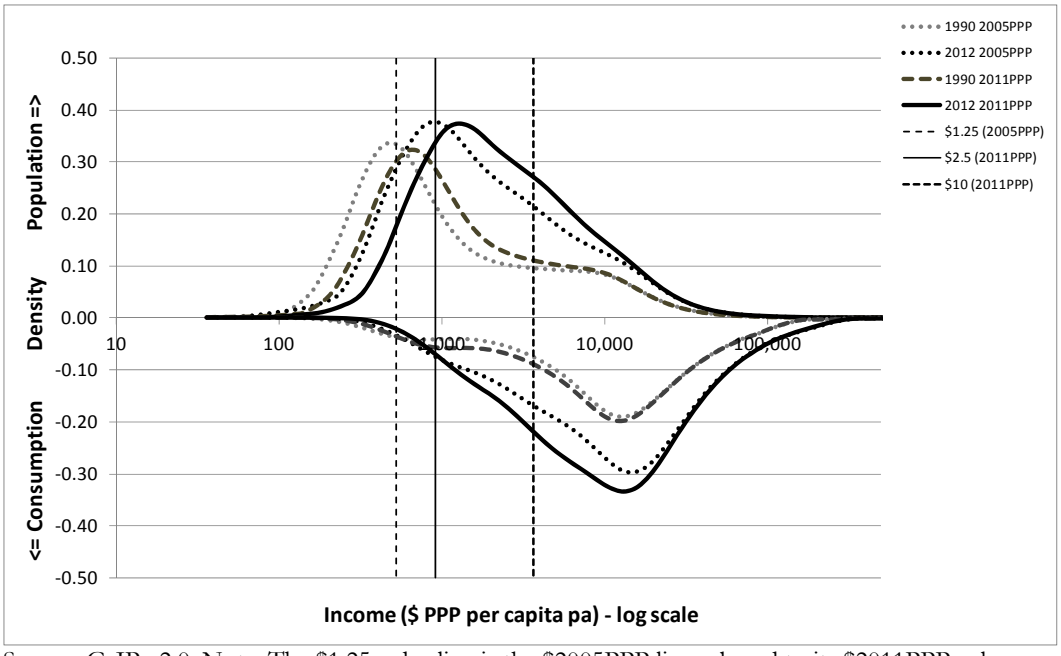
Source: GrIP v2.0. Note: Data based on survey means, income surveys adjusted; we calculate the within-country Gini directly from the distribution with between country consumption difference removed by setting all countries to the same average consumption per capita in the GrIP model; we calculate the between country inequality by removing all within country inequality in the GrIP model

What we think the above points towards is that when one considers the global distribution curve in its entirety, the primary difference in the global distribution between use of 2005 PPP and 2011 PPP is less than might first appear to be the case.

The commonality (across 2005PPP and 2011PPP) is that the 'twin peaks' world identified by Quah (1996) seems to be disappearing as the 'middle' between the peaks fills out. However, with the consumption curve plotted (see Figures 5 and 6), the world can be seen to be divided still into a large number of people centered around a relatively poor population peak and a much smaller number of richer people accounting for the global consumption peak – although the clear demarcation between these peaks (the concavity in the richer tail of the population curve and in the poorer tail of the consumption curve) that existed at the end of the Cold War is no longer so readily discernible. The figures below can be read thus: above the horizontal axis are standard density curves, while the curves below the horizontal axis are calculated as the density multiplied by the level of consumption, to show the total amount of consumption at that point. So while the area under each curve above the axis represents the total global population, the area under each curve below the axis represents total global consumption.[20]

In terms of the PPP revision itself from 2005 to 2011 PPPs, most of the additional consumption growth resulting from a shift from 2005PPP to the 2011PPP rates is concentrated in the region between the population peak and the consumption peak. The consumption peak has also not moved much relative to global population and occurs at the 93rd or 94th percentile throughout the period whether one uses 2005 or 2011PPP. In short, the new PPPs are less of a substantial change if one looks at the entire global distribution.

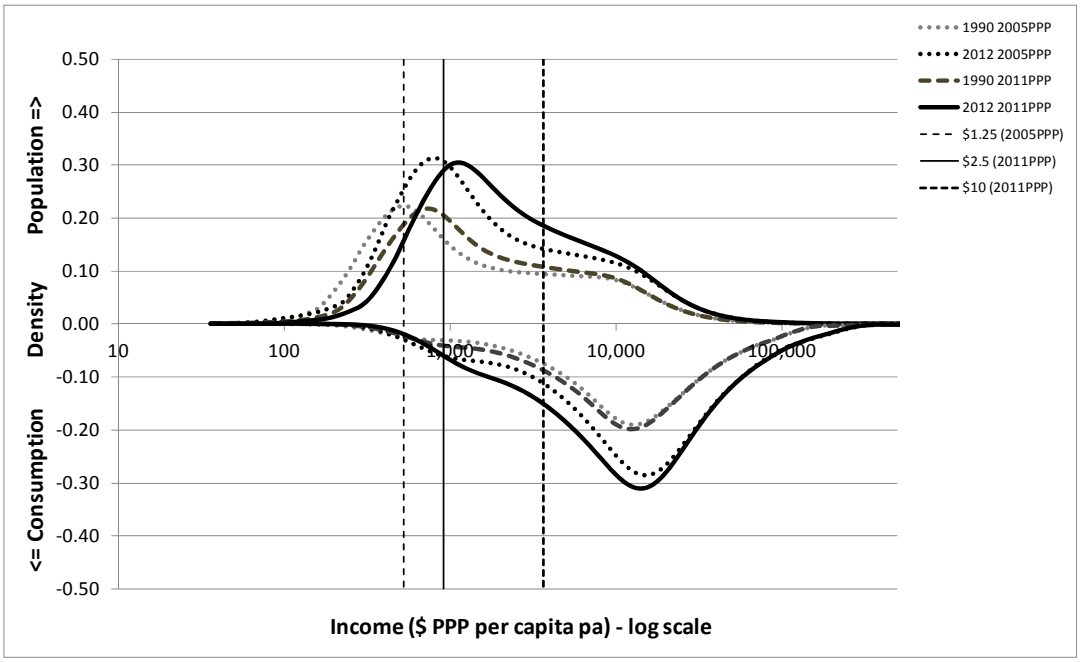
Figure 5: Global distribution curve, 1990 and 2012 by 2005 and 2011 PPPs



Source: GrIP v2.0. Note: The $1.25 a day line is the $2005PPP line rebased to its $2011PPP value.

[20] For a fuller description of how to interpret these distribution curves see Edward and Sumner (2014).

Figure 6: Global distribution curve without China, 1990 and 2012 by 2005 and 2011 PPPs



Source: GrIP v2.0. Note: The $1.25 a day line is the $2005PPP line rebased to its $2011PPP value.

5c. How Does Global Poverty Differ by Price Data Taken?

As noted at the outset of this paper, one of the biggest and most contentious questions after each PPP revision is what has happened to estimates of global poverty. In making the estimates below, we are not arguing that any of these poverty lines should be used.

We are simply saying that applying this logic gives you a global poverty cut-off such as this, and this is how many people are estimated to live below that level. In fact, our conclusion is that global poverty is so hypersensitive to very modest changes in the value of the lower end 'poverty' lines that, when a monetary poverty line is considered in isolation (from other lines or other measures of poverty), they may not be an enlightening measure of real changes in the living conditions of the poor. One possibility would be to stick with a given set of PPPs (e.g 2005 PPP) and poverty line (e.g. $1.25), and simply update each country using its own real growth rate. On this method you can be fairly confident of *changes* in poverty within a country, although not of the exact meaning of the *level* of poverty when compared between countries.

The issue is illustrated in Figure 7 which zooms in on the lower part of the population curve for 2012 using 2005PPP and 2011PPP. The area beneath each curve and to the left of the vertical poverty lines is proportional to the poverty headcount. It can be seen that at the $1.25 line the 2011PPP headcount is much lower than the 2005PPP headcount. But up at the $10 line the difference is relatively small.

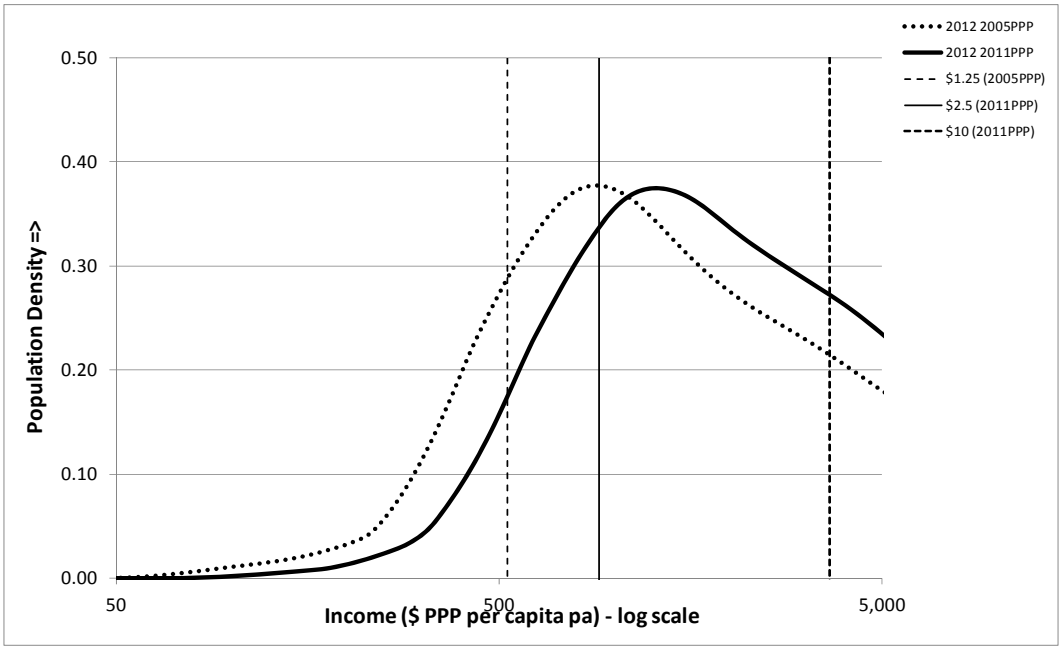
It is at the peak of the curve that a shift in the line makes the greatest difference to absolute poverty numbers but since this region lies close to both the 2005PPP and 2011PPP peaks changes in the poverty line near here do not lead to dramatic differences in poverty headcounts (meaning the proportion of population) between the PPP rates. This is because the change in headcount for a modest change in poverty line value is proportional to the height at which the distribution curve crosses the poverty line, and the two curves cross the $2.5 line at similar heights. However, as the line moves into the lower tails of the curves this height difference increases, both in absolute terms and proportionately. As a result, the $1.25 line is currently well down into the region of the distribution curve where the differences between the 2005PPP and 2011PPP headcounts become most acute (Figure 8). If higher poverty lines are considered the differences start to look considerably less significant.

Over-attention to a single poverty line headcount can therefore exaggerate the amount of change that has occurred with the move to 2011PPP rates and can divert attention away from more intractable poverty issues that only become apparent by considering other poverty lines or by reflecting on the overall shape of the distribution curve. For example, if one focuses on the number of people living at or below the peak of the distribution curve this turns out to have remained steady at about a third of the global population throughout the period 1990-2012 (and this is the same whether one uses 2005PPP or 2011PPP), and thus a lot less has changed for the poor than might be implied from the falls in lower absolute global poverty numbers as a result of the PPP revision.

We argue therefore that the updated PPP figures raise questions about the usefulness of focusing predominantly on any individual global poverty line, and especially one that is set low because such estimates of global poverty are hypersensitive to minor changes at the lower tail of the global distribution while blind to what is happening across the entire global distribution.

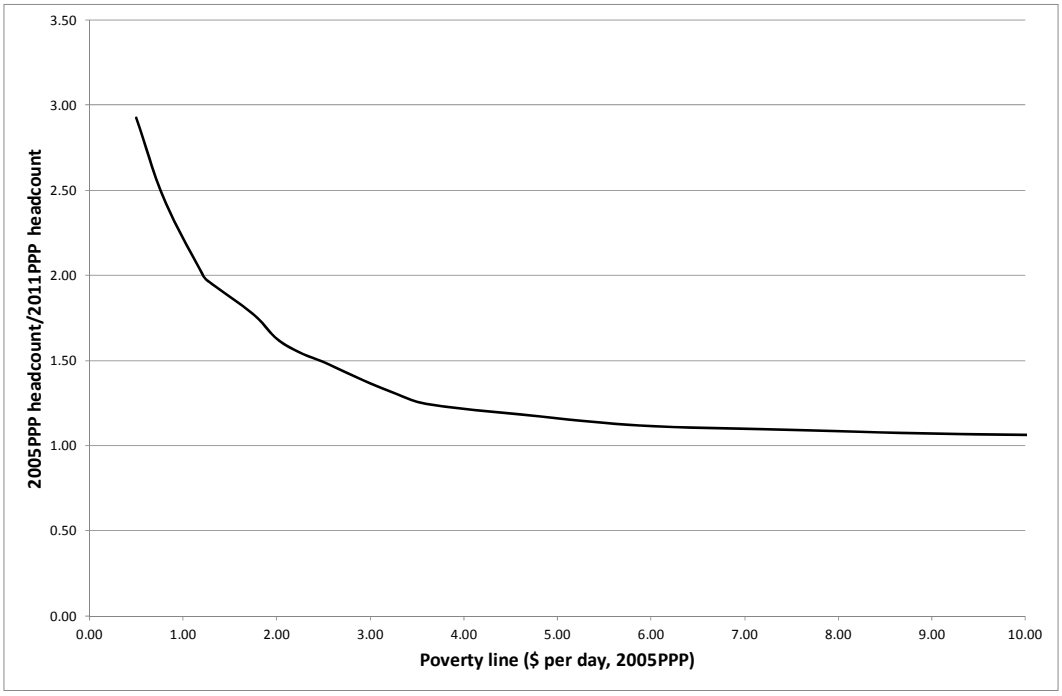
To reiterate from Section 2 of this paper, any estimates of global poverty need to be read with the inherent uncertainties in mind as we have identified. Second, as argued above, and although Deaton and Dupriez (2011) constructed new PPPs for consumption near the poverty line using 2005 PPPs and found that there was little difference between PPPs for the consumption of the poor and PPPs based on national accounts using the ICP2005, we would argue here that any estimates of global poverty are best viewed as a range of poverty lines (especially so given the point on food shares made by Ravallion and Chen, 2015).

Figure 7: Global population distribution curve (detail), 2012 by 2005 and 2011 PPP



Source: GrIP v2.0. Note: The $1.25 a day line is the $2005PPP line rebased to its $2011PPP value.

Figure 8: Ratio of 2005PPP to 2011PPP poverty headcounts at different poverty lines



Source: GrIP v2.0.

With all of the above caveats in mind, the first question is how to revise what was the global poverty line of $1.25 in 2005 PPP? The World Bank who historically declares and endorses particular $PPP poverty lines, could of course consider the 2011 PPP values of all the current national poverty lines of developing countries and take a mean (or median) of the poorest or all developing countries as done previously. Here we outline five other possibilities which have a *global* logic of some kind and/or have been proposed by others (see table 7). What the discussion points towards is that any poverty line set low will generate hypersensitive estimates of global poverty regardless of the logic underlying any line.

So even if a new global poverty line is the mean or median of all developing country national poverty lines (or some of them) it is going to be very sensitive to small changes. As we discuss below, for poverty lines of this order 10 cents one way or another can make the difference of 100 million people, which should at least caution one against over-reliance on any individual poverty line at this level.

Several other scholars have proposed lines and we discuss these now. One method to adjust the $1.25 (2005 PPP) poverty line would be by US Consumer Price Index (CPI) as per Dykstra et al., (2014).

A second method is to take the average poverty line for the poorest 15 countries as per the basis of the $1.25 poverty line (See Ravallion et al. 2008) or the average poverty line for the current poorest 15 countries or the average of the two averages as per Chandy and Kharas (2014). This is basically the same as the World Bank setting previously.

A third method is to take the same number of poor people as per $1.25 in 2010 in 2005 PPP and consider what would be a 'same number of poor' poverty line in 2011 PPP. This would be about $2. A fourth method is that one could set a global monetary poverty line equivalent to the estimated level of global multi-dimensional poverty of 1.6bn people in 2010 (OPHI, 2014). That would give a poverty line of $2.50.

Finally, one could take a $10 poverty line which is a proposal for a 'security from poverty' or 'middle class' consumption line developed and used by López-Calva and Ortiz-Juarez (2014) based on the 10% probability of falling back below national poverty lines (which are $4-$5/day in 2005PPP) in the near future in Mexico, Brazil and Chile. The 10% probability line is actually $8.50-$9.70 depending on whether Brazil, Mexico or Chile are used (and comparable estimates for Indonesia are $8.37 for a $4 national poverty line and $13.03 at $5, in 2005 PPP - see Sumner et al., 2014). Thus, the mean is $9.27 and if the mean is inflated to 2011 prices it is $10.47. However, given that this is not intended to be a precise estimate - rather a rough proxy used for illustration purposes here - we have kept it as $10 per capita (2011PPP).

One could easily raise some serious questions over the logic of these poverty lines. The critique of using US inflation to estimate the consumption of the poorest countries has been well discussed (see earlier references to Deaton), as has taking the poverty lines of the

poorest 15 countries (again see earlier references to Deaton). It may be more logical to take the number of poor under the $1.25 (2005PPP) poverty line or the number of multi-dimensionally poor globally to set a new (2011PPP) line though they may not be exactly the same people. Though in the latter, those may not be the same people there is comparative value of considering monetary poverty alongside multi-dimensional poverty. Finally, the $10 line will differ across countries in terms of a 'vulnerability to poverty' based on the national poverty line, depending on the PPP$ value of the national poverty line. However, such a higher line might be much less sensitive to future PPP revisions and $10 is the consumption at the top of the poorest decile in OECD HIC countries in 2012 (2011 PPP) which would mean it might qualify as a genuinely *global* poverty line.

Table 7: Global Poverty Lines in 2005 PPP and 2011 PPP

Global poverty line	**Logic**
$1.25 (2005 PPP)	Average poverty line of 15 poorest countries in 2008
$1.44 (2011 PPP)	$1.25 adjusted by US inflation (as per method of Dykstra et al., 2014)
$1.78 (2011 PPP)	Average of the average poverty line for poorest 15 countries when the line was established and current poorest 15 (as per method of Chandy and Kharas, 2014)
$2 (2011 PPP)	'Same number of poor' poverty line (same number of poor as per $1.25 in 2010 in 2005 PPP)
$2.50 (2011 PPP)	Monetary poverty line equivalent to estimates of multi-dimensional poverty in 2010
$10 (2011 PPP)	A 'security from poverty' line (Lopez-Calva and Ortiz-Juarez, 2014)

In sum, we have chosen to focus on this set of poverty lines because others have proposed them ($1.44 and $1.78) or because they have some underlying global logic ($2, $2.50 and $10). It would be best to view these lines for what they actually are, which is simply consumption cut-off levels rather than 'poverty' lines. Figures 9-13 compare estimates for these poverty lines in terms of poverty headcounts and the poverty gap (as a percentage of global GDP) and we add projections for 2030 poverty based on assumptions for growth and inequality (see figures 12 and 13). The projections in these figures are simply for illustration of what the $2.50 and $10 poverty headcounts might be in 2030 based on a range of scenarios.

If one considers the global distribution curve above, the peak (mode) of the global population distribution in 2012 is at approximately $3.50 a day in 2011PPP and there are 2.3bn people below that. Using 2005PPP the peak in 2012 is at the $2.14 in 2005PPP or $2.46 in 2011PPP.

Taking 2011 PPPs, in 2012 there are 450m people below $1.44 but another 1bn people between that $1.44 line and a $2.50 line and almost another billion people between that $2.50 cut off and the $3.50 peak. Furthermore, there are 3.2bn people between $2.50 and

$10 (or 2.5bn people between $3.50 and $10) who arguably are perhaps not destitute or day-to-day poor but may still not be living secure lives free from the risk of poverty (See also annex table A9).

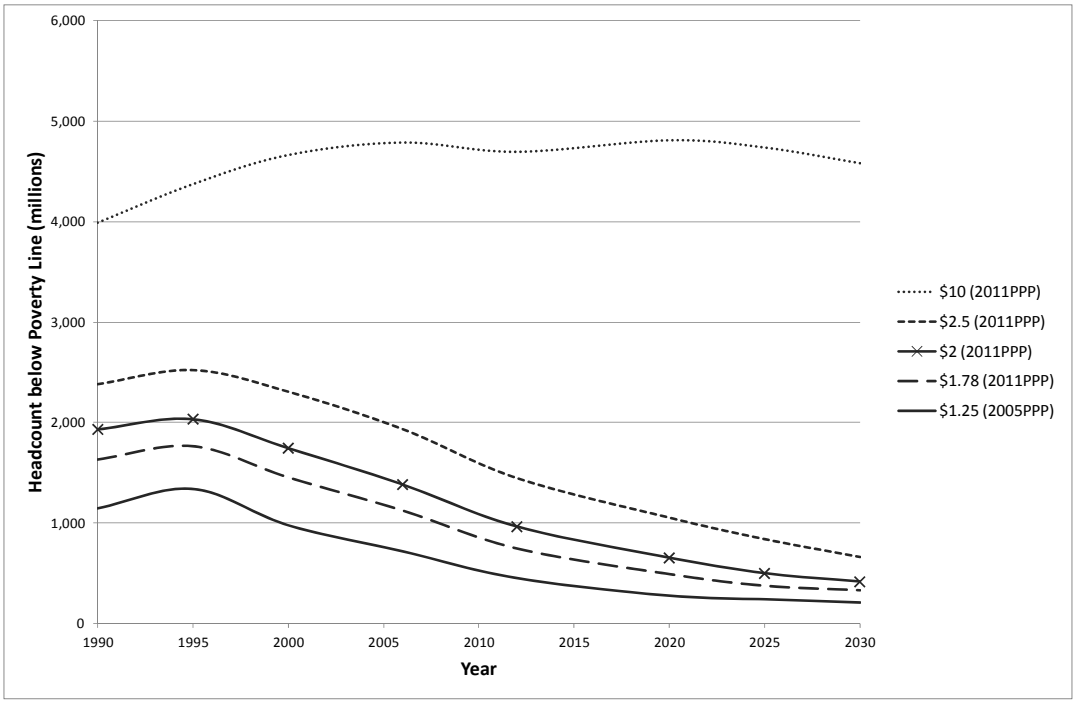
Table 8: The distribution of global poverty by various poverty lines (millions of people), 2012

	$1.25 (2005 PPP)	$1.44 (2011 PPP)	$1.78 (2011 PPP)	$2 (2011 PPP)	$2.50 (2011 PPP)	$10 (2011 PPP)
Total	982	449	745	963	1,447	4,695
India	273	94	200	288	484	1,198
China	71	20	59	85	145	939
East Asia and Pacific exc. China	61	9	31	50	95	470
Europe and Central Asia	9	8	11	14	21	212
Latin America and Caribbean	46	37	50	59	81	377
Middle East and North Africa	6	0	2	4	11	230
North America	5	5	6	6	8	37
SAsia exc. India	84	26	49	67	115	390
Sub-saharan Africa	426	251	337	390	487	843
LICs	318	215	298	350	446	726
LMICs	536	170	326	453	751	2,286
LMICs minus India	263	76	126	165	267	1,088
UMICs	120	57	112	149	236	1,523
UMICs minus China	49	37	53	64	90	584
LDCs	343	220	307	362	464	784
Fragile and Conflict-Affected States	143	102	129	147	178	327

Source: GrIP v2.0. Note: Current income classifications (2014); Fragile States = World Bank definition; $10 figures based on best fit of GQ or Beta Lorenz functions. All others based on linear model.

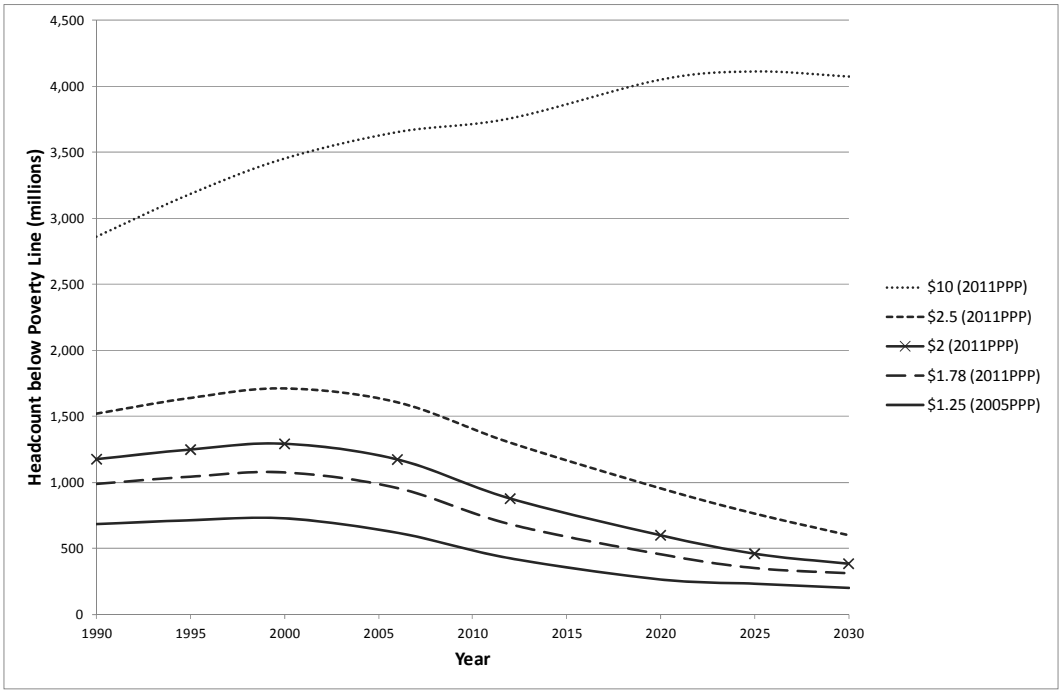
In sum, any new global poverty line set low runs the risk, given the density of population, that a dime (10 cents) here or there in the poverty line taken could be equivalent to a change in global poverty by, a not insignificant, 100 million people. And given that the risk of poverty could extend up to $10-a-day (or beyond) rather than thinking of global poverty in the order of 1-1.5 billion people, something in the order of more than 4.5 billion people might be more appropriate, or at least recognition that the 1.5 billion people under a $2.50 line, sit alongside more than another 3 billion people who may be at risk of poverty, living on consumption in-between the $2.50 to $10 range (which is still below the US poverty line value in 2011 PPP) and poor when compared the poorest decile in OECD HIC countries.

Figure 9: Estimates of global poverty at various poverty lines, millions, 1990-2030 using 2011PPP (projections from 2012 based on IMF WEO minus 1% and current inequality trends)



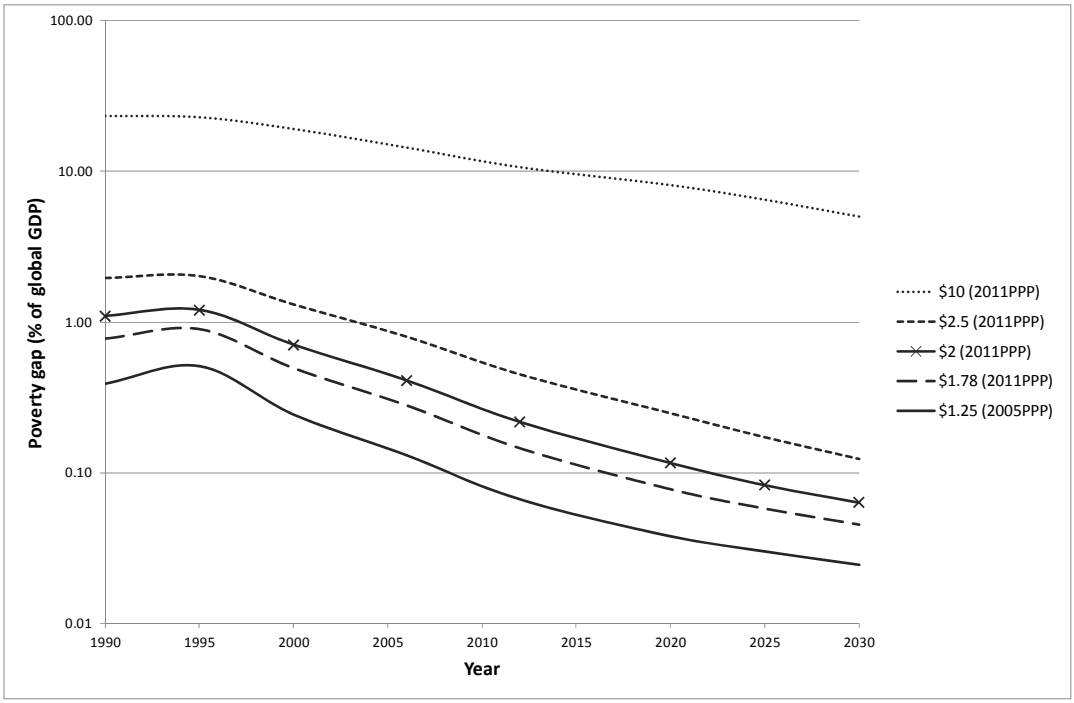
Source: GrIP v2.0.Note: The $1.25 a day line is the $2005PPP line rebased to its $2011PPP value.

Figure 10: Estimates of global poverty excluding China at various poverty lines, millions, 1990-2030 using 2011PPP (projections from 2012 based on IMF WEO minus 1% and current inequality trends)



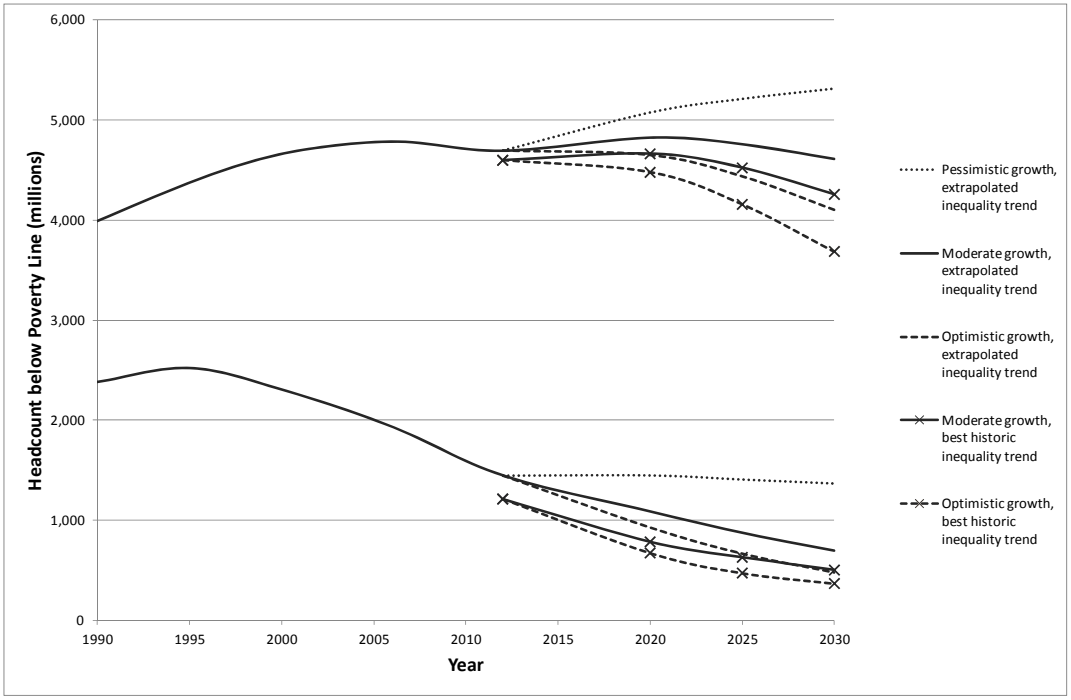
Source: GrIP v2.0. Note: The $1.25 a day line is the $2005PPP line rebased to its $2011PPP value.

Figure 11: Estimates of global poverty gap (as a % of global GDP) at various poverty lines, 1990-2030 (log scale) (projections from 2012 based on IMF WEO minus 1% and current inequality trends)



Source: GrIP v2.0.

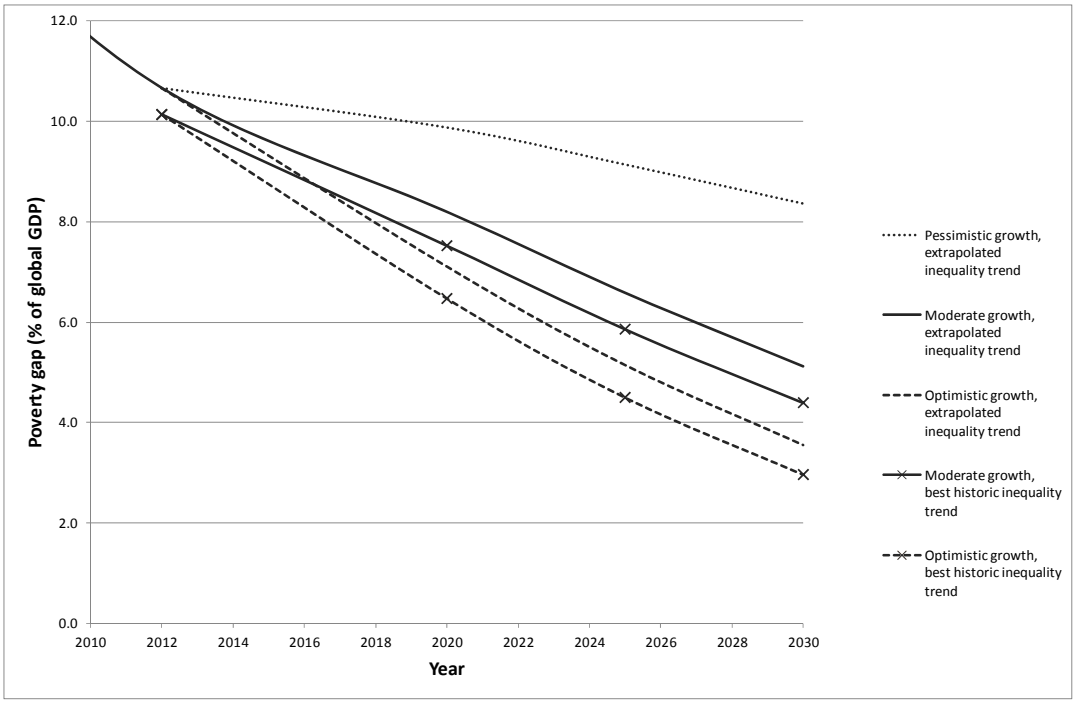
Figure 12: Estimates of global poverty at $10/day and $2.50/day using IMF WEO growth projections and various distribution scenarios, 1990-2030



Source: GrIP v2.0. Notes: 'Optimistic' = IMF WEO growth projections; 'Moderate' = IMF WEO growth

projections minus 1%; 'Pessimistic' = half IMF WEO growth projections; 'Extrapolated' = inequality trend extrapolated; 'Best historic' = if inequality were to return to the lowest level of inequality since 1990.

Figure 13: Estimates of global poverty gap at $10/day using IMF WEO growth projections and various distribution scenarios, 2010-2030

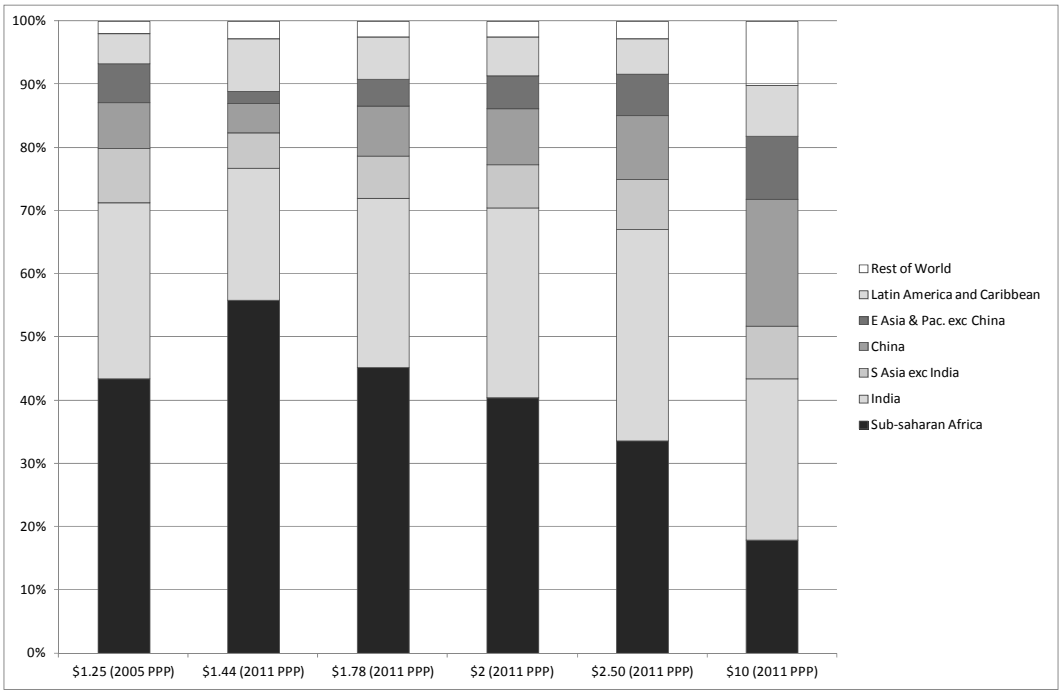


Source: GrIP v2.0.

In short, focusing on low poverty lines, given the density of population, becomes very questionable given the hypersensitivity of any estimates to even small changes in the value of the poverty line taken and may distract attention from the fact global poverty at $10-a-day (which is still below the US poverty line) amounts to more than 4 billion people. While this may sound bleak, the cost of ending global poverty at $10 a day could fall to just 5% of global GDP by 2030 (based on the IMF WEO growth projection for each country minus historical error and contemporary inequality trends by each country – our moderate growth scenario) (see Figure 13). Further, if inequality were to fall to the lowest point in each country's post-Cold War period and growth met IMF WEO projections (our optimistic growth scenario) the number of people living under $10 would fall to 3.7 billion in 2030 and the cost of ending $10 poverty would fall to just 3% of global GDP.

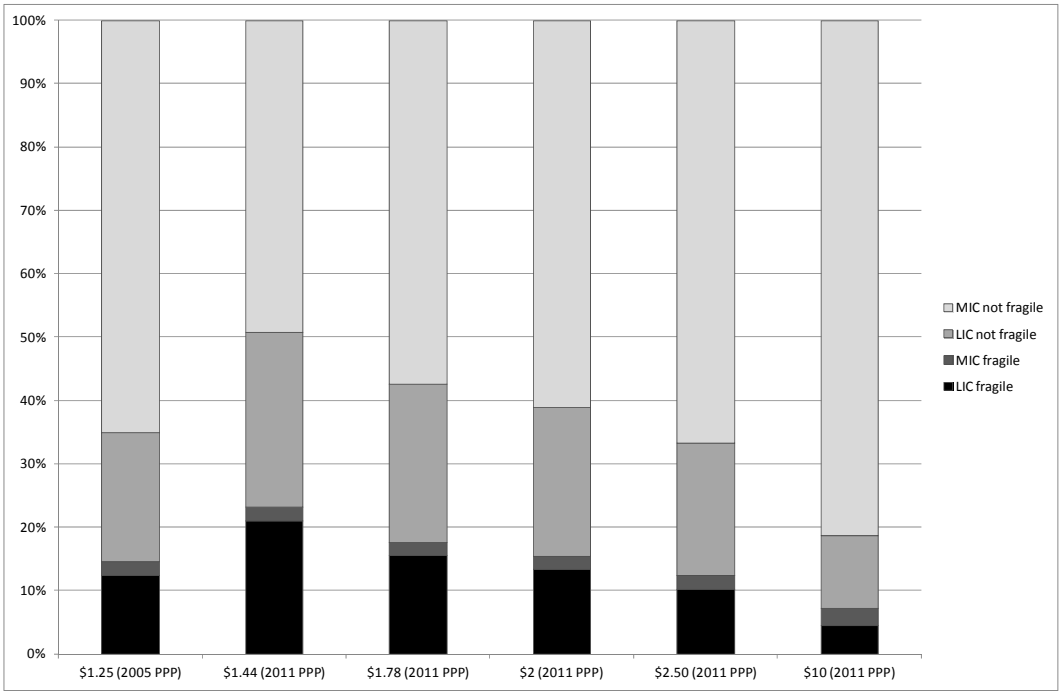
The PPP revision also changes the location of global poverty depending on the poverty line used. In short, as noted by Deaton, lower poverty lines 'Africanise' poverty and very marginally higher poverty lines 'Asianise' poverty (see figure 14). One could add to this that lower poverty lines also shift global poverty away from middle income countries to low income countries (and UN LDCs), and from non-fragile states to fragile states (as noted previously using 2005PPPs in Edward and Sumner, 2013a, 2014). Conversely, only very slightly higher poverty lines shift the burden of global poverty towards MICs and countries not defined as fragile states or UN LDCs (see table 7 and figures 15 and 16).

Figure 14: The distribution of global poverty (% global total) by region, 2012, by 2005 PPPs and 2011 PPPs



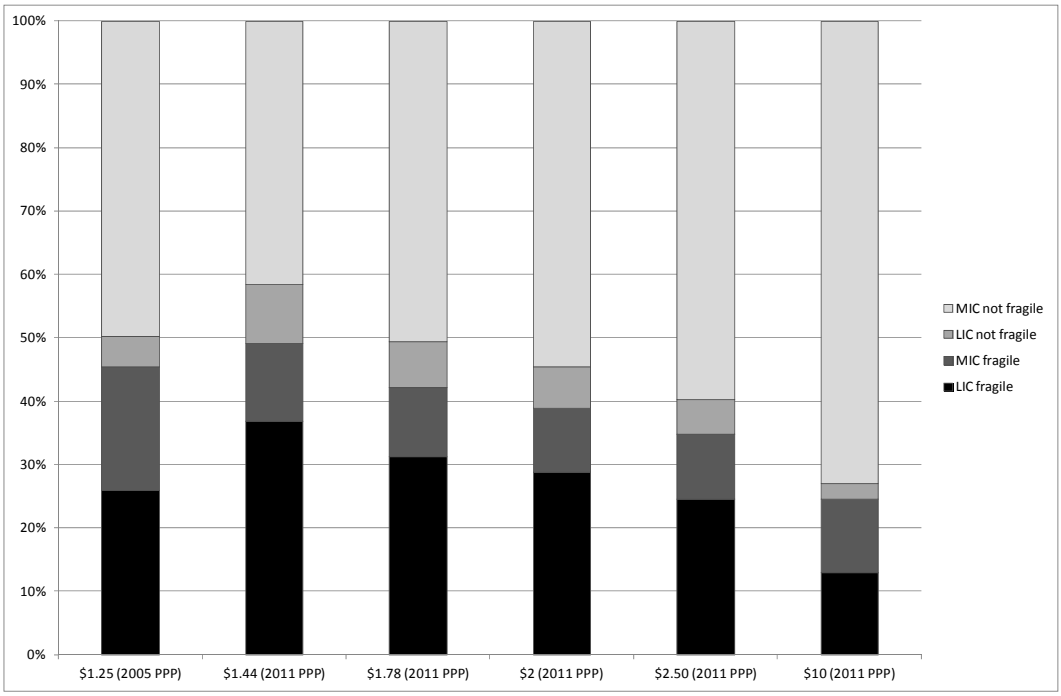
Source: GrIP v2.0.

Figure 15: The distribution of global poverty by country income category and World Bank definition of Fragile States, 2012, by 2005 PPPs and 2011 PPPs



Source: GrIP v2.0.

Figure 16: The distribution of global poverty by country income category and OECD-DAC definition of Fragile States, 2012, by 2005 PPPs and 2011 PPPs



Source: GrIP v2.0.

The setting of global poverty lines thus determines who counts as poor and where they live and given that very marginally higher lines change levels and locations of global poverty we would argue that the use of lower poverty lines is problematic. One could also say that when one compares the 2005 and 2011PPP charts there does not seem to be that much difference other than over where one might draw the poverty lines. Of course one could also say that at any given poverty line there are fewer people living under that line when the 2011PPPs are used.

However, we would argue that this is an issue of the poverty line taken rather than that the new PPPs really changed the global consumption distribution that much overall. Again, this might lead one to say that the ICP2011 was less of a revision than it may have first appeared.

6. Conclusions

In this paper we have made new estimates for global poverty and inequality, 1990-2012 (and some projections to 2030) in order to ask how much difference the choice of price data makes to those estimates of global poverty and inequality. On the one hand one could say that global inequality is less than previously thought – meaning it is less using 2011PPP than using 2005 PPP data - but one could also say that the change is not that large. In short, global inequality between individuals is about the same as inequality in South Africa and global inequality between countries is about the same as inequality within Brazil.

Furthermore, the falls in global inequality from 1990-2012 almost evaporate once China is removed from global inequality estimates.

In sum, the choice of PPPs used makes some difference but not a great deal and the levels of global inequality remain very high. Furthermore, trends without China show global inequality is barely falling whatever PPPs are used. That said, although the world can be seen to be divided still into a large number of people centered around a relatively poor population peak and a much smaller number of richer people accounting for the global consumption peak, the clear demarcation between these 'twin peaks' that existed at the end of the Cold War is no longer so readily discernible.

Those at the bottom of the global distribution consume no more than they did at a given point in time. All that has happened is that our estimates of the value of what they consume have changed – which implies that our poverty lines should change. The new price data merely reminds us that very low poverty lines are so hypersensitive that they may not be very robust or useful as a measure of real changes in the living conditions of the poor. We find that around the one or two dollars-a-day level an extra dime can add 100 million to the global poverty count raising some serious questions as to whether this hypersensitivity undermines any global poverty line set around that level.

Further, it is worth noting that lower poverty lines not only Africanize global poverty, but they also push global poverty into fragile states and the poorest countries by income per capita, low income countries, while a few dimes more or barely higher global poverty lines Asianize or push global poverty away from fragile states and the world's poorest countries.

When one looks at slightly higher poverty lines it becomes apparent that a lot less has changed for the poor than might be inferred from the falls in extreme ($1.25 a day) poverty numbers due to the new PPPs. Differences in poverty estimates between the PPP rates are much smaller as the poverty line rises above $5 a day and towards $10 a day, and notably, the number of people living at or below the peak of the global distribution curve has remained steady at 33% throughout the period 1990-2012, being the same whether one uses 2005PPP or 2011PPP. From the point of view of a wider perspective on the global distribution the impact of the new PPPs is considerably less substantial than it may have first appeared.

The updated PPP figures we argue therefore raise questions about the usefulness and relevance of relying on a single global poverty line, and especially one that is set at a very low level because such estimates of global poverty are hypersensitive to minor changes at the lower tail of the global distribution while blind to what is happening across the entire global distribution.

In conclusion, our aim in this paper is not to argue for or against any particular poverty line. The issue here is more about how the new PPP rates expose the sensitivity of poverty estimates to PPP estimates, particularly at poverty lines below around $5 a day (with sensitivity increasing as the poverty line is reduced below this value). This value easily

exceeds any global absolute poverty line that is likely to be proposed in the near future for, for example, the UN Sustainable Development Goals. In view of the inherent uncertainties in PPP estimates it is important therefore not to become too reliant on any single poverty line.

Approaches to global poverty need to be informed instead by a broader understanding of the overall global consumption distribution and of how very modest changes to the assumed poverty line lead to significantly different understandings of the scale and geography or location of global poverty. It would therefore be better, we suggest, to make estimates with a range of poverty lines, probably up to at least $10-a-day, so as to pay greater attention to the global distribution overall and to the distribution of the growth increment.

References

Atkinson, A., and 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): 771–99.

Alvaredo, F., Atkinson, A., Piketty, T., & Saez, E. (2014). *The world top incomes database*. Retrieved from http://topincomes.g-mond.parisschoolofeconomics.eu

Anand, S., & Segal, P. (2008). What do we know about global income inequality? *Journal of Economic Literature*, 46(1), 57-94.

Anand, S., & Segal, P. (2014). *The global distribution of income* (IDI Working Paper). King's College London. In (forthcoming) (eds), Anthony B. Atkinson & François Bourguignon, Handbook of Income Distribution, Volume 2. Amsterdam: Elsevier.

Chandy, L., & Kharas, H. (2014).What do new price data mean for the goal of ending extreme poverty? Brookings Institution blog, 5 May. Retrieved from www.brookings.edu/blogs/up-front/posts/2014/05/05-data-extreme-poverty-chandy-haras

Chen, S., & Ravallion, M. (2010). The developing world is poorer than we thought, but no less successful in the fight against poverty. *Quarterly Journal of Economics*, 125(4), 1577-1625.

Dang, H-A., Lanjouw, P., & Serajuddin, U. (2014). Updating poverty estimatesat frequent intervals in the absence of consumption data. Methods and illustration with reference to a middle-income country (World Bank Policy Research Working Paper). Washington DC: World Bank.

Datt, G. (1998). Computational tools for poverty measurement and analysis (FCND Discussion Paper 50). Washington DC: Food Consumption and Nutrition Division International Food Policy Research Institute.

Deaton, A. (2005). Measuring poverty in a growing world (or measuring growth in a poor world). *The Review of Economics and Statistics*, 87(1), 1-19.

Deaton, A. (2010). Price indexes, inequality, and the measurement of world poverty. *American Economic Review*, 100(1), 5-34.

Deaton, A. (2011). Measuring development: Different data, different conclusions. Paper presented at the 8th AFD-EUDN Conference. EUDN, Paris.

Deaton, A., & Aten, B. (2014). Trying to understand the PPPs in ICP2011: Why are the results so different? (National Bureau of Economic Research Working Paper). Massachusetts Avenue, Cambridge MA: NBER.

Deaton, Angus, & Dupriez, Olivier (2011). Purchasing power parity exchange rates for the global poor. *American Economic Journal: Applied Economics*, 3(2), 137-166.

Deaton, A., & Heston, A. (2010). Understanding PPPs and PPP-based national accounts. *American Economic Journal*, 2(4), 1-35.

Deininger, K., & Squire, L. (1996). A new data set measuring income inequality. *World Bank Economic Review*, 10, 565-591.

Dykstra, Sarah, Kenny, Charles, & Sandefur, Justin (2014). Global absolute poverty fell by almost half on Tuesday. Center for Global Development blog, 2 May.

Edward, P. (2006). Examining inequality: Who really benefits from global growth? *World Development*, 34(10), 1667-1695.

Edward, P., & Sumner, A. (2013a). The future of global poverty in a multi-speed world: New estimates of scale and location, 2010–2030 (Centre for Global Development (CGD) Working Paper). Washington DC: CGD.

Edward, P., & Sumner, A. (2013b). The geography of inequality (Centre for Global Development (CGD) Working Paper). Washington DC: CGD.

Edward, P., & Sumner, A. (2014). Estimating the scale and geography of global poverty now and in the future: How much difference do method and assumptions make? *World Development*, 58, 67-82.

ICP (2014a). Purchasing power parities and real expenditures of world economies: Summary of results and findings of the 2011 International Comparison Program. Washington DC: World Bank.

ICP (2014b). Purchasing power parities and the real size of world economies: A comprehensive report of the 2011 International Comparison Program. Washington DC: World Bank.

Inklaar, R., & Rao, D. (2014). Cross-country income levels over time: Did the developing world suddenly become much richer? (Research Memorandum). The Netherlands: Groningen Growth and Development Centre (GGDC), University of Groningen.

Klasen, S. (2010). Levels and trends in absolute poverty in the world: What we know and what we don't. Paper prepared for the International Association for Research in Income and Wealth, St. Gallen, Switzerland, August 22-28.

Korinek, A., Mistiaen, J., & Ravallion, M. (2006). Survey nonresponse and the distribution of income. *Journal of Economic Inequality*, 4/2, 33-55.

Lahoti, R., Jayadev, A., & Reddy, S. (2014). The global consumption and income project (GCIP): An introduction and preliminary findings. Retrieved from www.globalconsumptionandincomeproject.org

Lakner, Christoph, & Milanovic, Branko (2013). Global income distribution: From the fall of the Berlin Wall to the Great Recession (World Bank Policy Research Working Paper 6719). Washington DC: World Bank.

López-Calva, Luis F., & Ortiz-Juarez, Eduardo (2014). A vulnerability approach to the definition of the middle class. *The Journal of Economic Inequality*, 12.1, 23-47.

Milanovic, B. (2012). Global income inequality by the numbers: In history and now. An overview (World Bank Policy Research Working Paper). Washington DC: World Bank.

Milanovic, B. (2014). National vices, global virtue: Is the world becoming more equal? Retrieved from http://glineq.blogspot.co.uk/2014/12/national-vices-global-virtue-is-world.html?spref=tw

Milanovic, B. (2009) Global inequality recalculated: the effect of new 2005 PPP estimates on global inequality, Policy Research Working Paper Series 5061. World Bank: Washington DC

Niño-Zarazúa., M., Roope, L., & Tarp, F. (2014). Global interpersonal inequality: Trends and measurement (WIDER Working Paper 2014/004). Helsinki: WIDER.

OPHI (2014) Multi-dimensional Poverty Dataset. OPHI: Oxford.

Quah, D. (1996). Twin peaks: Growth and convergence in models of distribution dynamics. *The Economic Journal*, 106(437), 1045-1055.

Ravallion, M. (2003). Measuring aggregate welfare in developing countries: How well do national accounts and surveys agree? *The Review of Economics and Statistics*, 85, 645-652.

Ravallion, M. (2010) Price levels and economic growth: Making sense of the PPP changes between ICP rounds. World Bank Policy Research Working Paper. World Bank: Washington DC

Ravallion, M. (2014a). An exploration of the International Comparison Program's new global economic landscape (National Bureau of Economic Research Working Paper). Massachusetts Avenue, Cambridge MA: NBER.

Ravallion, M. (2014b). India's puzzling new PPP. CGD blog, 5 August. Retrieved from www.cgdev.org/blog/india's-puzzling-new-ppp

Ravallion, M., & Chen, S. (2015). Rising food prices in poor countries: A new clue to those puzzling PPP revisions. CGD blog, 27 Jan. Retrieved from www.cgdev.org/blog/rising-food-prices-poor-countries-new-clue-those-puzzling-ppp-revisions

Ravallion, M., Chen, S., and Sangraula, P. (2008) Dollar a Day Revisited. World Bank Policy Research Working Paper. Washington DC: World Bank.

Sala-i-Martin, X. (2002). The world distribution of income (estimated from individual country distributions). Mimeo. New York NY: Columbia University.

Sumner, A., Yusuf, A., & Suara, Y. (2014). The prospects of the poor: A set of poverty measures based on the probability of remaining poor (or not) in Indonesia (Working Papers in Economics and Development Studies (WoPEDS)). Bandung: Department of Economics, Padjadjaran University, Indonesia.

United Nations, Department of Economic and Social Affairs, Population Division (2013). World population prospects: The 2012 revision, DVD edition. New York NY: UNDESA.

Data Annex

Table A1: Changes in 2012 GDP values on the introduction of 2011PPP rates

		Change 2011PPP to 2005PPP (%)	GDP ($ billions)		
			In 2011PPP	2005PPP inflated to 2011PPP	In 2005PPP
World		16.6	95,825	82,176	73,251
East Asia and Pacific (EAP)		18.4	28,459	24,032	21,422
Europe and Central Asia (ECA)		11.7	23,832	21,337	19,019
Latin America & Caribbean (LAC)		19.5	8,740	7,314	6,519
Middle East & North Africa (MNA)		51.2	6,905	4,566	4,070
North America (NAM)		0.2	17,413	17,379	15,492
South Asia Region (SAR)		37.1	7,696	5,614	5,005
Sub-saharan Africa (SSA)		36.5	2,895	2,120	1,890
E Asia less China		18.5	28,437	24,007	21,400
S Asia less India		37.1	7,696	5,614	5,005
High Income		6.9	50,226	46,987	41,884
UMIC		22.2	30,287	24,785	22,093
LMIC		46.6	14,155	9,658	8,609
LIC		19.5	1,361	1,139	1,016
Population 100m or more (2012 popn in millions)					
China	1,351	20.5	14,529	12,058	10,748
India	1,237	34.8	6,245	4,635	4,131
United States	314	0.0	15,965	15,965	14,232
Indonesia	247	84.8	2,186	1,183	1,054
Brazil	199	24.4	2,845	2,287	2,039
Pakistan	179	61.8	781	483	430
Nigeria	169	102.0	893	442	394
Bangladesh	155	29.9	366	281	251
Russia	143	36.6	3,337	2,444	2,178
Japan	128	-1.1	4,450	4,497	4,009
Mexico	121	11.3	1,972	1,771	1,579
Philippines	97	40.8	581	412	368

Note: To maximise consistency with WDI HFCE data, the inflator used is the value implicit in the USA HFCE data in WDI. This is slightly less than the inflator that would be estimated from US CPI for the same period (1.122 compared to 1.152).

Table A2: 2012 Global poverty estimates with and without income surveys adjusted to align to consumption surveys, 2005 and 2011 PPP

	Poverty headcounts (% of global total)							Poverty headcounts (millions)					
	$1.44 (2011 PPP)		$2.50 (2011 PPP)		$10 (2011 PPP)			$1.44 (2011 PPP)		$2.50 (2011 PPP)		$10 (2011 PPP)	
	Not adjusted	Adjusted	Not adjusted	Adjusted	Not adjusted	Adjusted		Not adjusted	Adjusted	Not adjusted	Adjusted	Not adjusted	Adjusted
Total	100.0	100.0	100.0	100.0	100.0	100.0		422	449	1,405	1,447	4,567	4,695
East Asia and Pacific (EAP)	6.8	6.5	17.0	16.6	30.5	30.0		29	29	238	240	1,394	1,409
EAP exc China	2.0	2.0	6.6	6.6	10.0	10.0		8	9	93	95	455	470
Europe and Central Asia	1.4	1.7	1.3	1.5	4.0	4.5		6	8	18	21	185	212
Latin America and Caribbean)	4.1	8.3	3.7	5.6	6.9	8.0		17	37	52	81	314	377
Middle East and North Africa	0.1	0.1	0.8	0.8	5.0	4.9		0	0	11	11	226	230
North America	0.0	1.0	0.0	0.6	0.4	0.8		0	5	0	8	17	37
South Asia Region (SAR)	28.3	26.6	42.6	41.4	34.8	33.8		119	119	599	599	1,588	1,588
SAR exc India	6.1	5.7	8.2	8.0	8.5	8.3		26	26	115	115	390	390
Sub-saharan Africa	59.4	55.8	34.6	33.6	18.5	18.0		251	251	487	487	843	843
India	22.2	20.9	34.4	33.4	26.2	25.5		94	94	484	484	1,198	1,198
China	4.8	4.5	10.3	10.0	20.6	20.0		20	20	145	145	939	939
LICs	50.7	47.8	31.7	30.8	15.9	15.5		214	215	445	446	726	726
LMICs	39.6	37.8	53.1	51.9	50.0	48.7		167	170	746	751	2,281	2,286
LMICs minus India	17.4	16.9	18.7	18.5	23.7	23.2		73	76	262	267	1,084	1,088
UMICs	9.6	12.8	15.1	16.3	32.0	32.5		40	57	212	236	1,461	1,523
UMICs minus China	4.8	8.2	4.8	6.2	11.4	12.4		20	37	67	90	522	584
LDCs	52.0	49.0	33.0	32.1	17.2	16.7		219	220	463	464	784	784
Fragile and Conflict-Affected States (World Bank definition)	24.0	22.8	12.6	12.3	7.1	7.0		101	102	177	178	327	327

Table A3: Estimates of global inequality, 1990-2012 by 2005 and 2011PPP

	1990	1995	2000	2006	2012
Between individuals					
Global, 2011PPP	0.676	0.685	0.667	0.643	0.605
Global (excl. China), 2011PPP	0.658	0.664	0.671	0.659	0.629
Global, 2005PPP	0.713	0.721	0.707	0.686	0.653
Global (excl. China), 2005PPP	0.693	0.700	0.708	0.700	0.678
Between countries					
Global, 2011PPP	0.579	0.594	0.576	0.537	0.488
Global (excl. China), 2011PPP	0.544	0.558	0.572	0.551	0.517
Global, 2005PPP	0.627	0.641	0.625	0.597	0.561
Global (excl. China), 2005PPP	0.595	0.607	0.620	0.607	0.582
Within countries					
Global, 2011PPP	0.381	0.401	0.393	0.396	0.391
Global (excl. China), 2011PPP	0.399	0.403	0.404	0.405	0.396

Note: Data based on survey means, income surveys adjusted.

Table A4: Global poverty headcount and gap, 1990-2030 (2011 PPP)

Headcounts (millions)								
PL	1990	1995	2000	2006	2012	2020	2025	2030
$1.25 (2005PPP)	1,145	1,340	977	717	449	286	247	209
$1.78 (2011PPP)	1,629	1,762	1,452	1,123	745	511	392	344
$2 (2011PPP)	1,931	2,034	1,745	1,382	963	677	521	434
$2.5 (2011PPP)	2,381	2,521	2,307	1,935	1,447	1,087	873	693
$10 (2011PPP)	3,992	4,375	4,663	4,786	4,695	4,826	4,760	4,613
Headcounts excl. China (millions)								
PL	1990	1995	2000	2006	2012	2020	2025	2030
$1.25 (2005PPP)	686	716	730	621	429	282	246	209
$1.78 (2011PPP)	991	1,046	1,078	960	686	478	372	329
$2 (2011PPP)	1,176	1,249	1,293	1,174	878	625	484	405
$2.5 (2011PPP)	1,521	1,640	1,712	1,607	1,302	990	799	634
$10 (2011PPP)	2,861	3,184	3,452	3,652	3,755	4,066	4,133	4,104
Poverty gap (% of global GDP)								
PL	1990	1995	2000	2006	2012	2020	2025	2030
$1.25 (2005PPP)	0.39	0.51	0.24	0.13	0.07	0.04	0.03	0.02
$1.78 (2011PPP)	0.77	0.90	0.49	0.28	0.14	0.08	0.06	0.05
$2 (2011PPP)	1.09	1.20	0.70	0.41	0.22	0.12	0.09	0.07
$2.5 (2011PPP)	1.97	2.03	1.31	0.80	0.45	0.26	0.18	0.13
$10 (2011PPP)	23.19	22.75	19.03	14.35	10.66	8.20	6.59	5.12

Source: GrIP v2.0. Note: $10 figures based on best fit of GQ or Beta Lorenz functions. All others based on linear model. 2030 figures are based on the moderate economic growth scenario and extrapolated inequality trends.

Table A5: Global poverty, 1990 (2011 PPP)

	$1.44			$1.78			$2			$2.50			$10		
	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)
Total	1,145	22.4	0.4	1,629	31.9	0.8	1,931	37.8	1.1	2,381	46.6	2.0	3,992	78.1	23.2
Total exc China	686	17.3	0.3	991	24.9	0.5	1,176	29.6	0.7	1,521	38.3	1.3	2,861	72.0	16.5
Regions															
EAP	547	31.7	0.9	772	44.8	1.9	919	53.3	2.7	1,078	62.5	4.9	1,535	89.0	51.2
ECA	12	1.5	0.0	24	2.9	0.0	33	4.0	0.0	56	6.7	0.1	337	40.6	3.3
LAC	70	15.9	0.4	91	20.8	0.6	104	23.9	0.8	134	30.7	1.3	344	78.8	18.6
MNA	4	1.8	0.0	9	3.9	0.1	13	5.6	0.1	23	9.9	0.2	165	72.6	12.8
NAM	1	0.2	0.0	2	0.6	0.0	2	0.8	0.0	4	1.4	0.0	31	11.2	0.3
SAR	309	27.5	1.7	485	43.1	4.1	586	52.2	6.1	778	69.2	12.1	1,112	99.0	149.6
SSA	202	41.2	3.6	247	50.2	5.9	274	55.6	7.7	310	63.0	12.0	468	95.1	107.1
China	459	40.5	3.8	638	56.2	7.7	755	66.5	10.9	860	75.7	19.4	1,132	99.7	187.9
India	231	26.5	1.6	369	42.5	4.0	449	51.7	6.1	600	69.0	12.2	861	99.1	154.3
Current Classifications															
HIC	4	0.4	0.0	7	0.7	0.0	10	0.9	0.0	18	1.6	0.0	234	21.1	1.0
UMIC	536	28.5	0.9	746	39.6	1.8	884	46.9	2.5	1,033	54.8	4.5	1,705	90.5	50.0
LMIC	407	23.6	1.0	629	36.5	2.3	764	44.3	3.5	1,020	59.2	6.8	1,666	96.8	90.4
LIC	198	50.2	9.3	247	62.5	15.5	274	69.5	20.2	310	78.6	32.3	387	98.0	259.2
LDC	210	49.6	8.2	261	61.6	13.7	290	68.6	17.8	330	77.9	28.4	416	98.3	230.2
Fragile States	55	37.0	4.3	66	44.8	6.9	72	48.5	8.7	84	56.9	13.5	141	95.4	129.4

Source: GrIP v2.0. Note: Current income classifications (2014); Fragile States = World Bank definition; $10 figures based on best fit of GQ or Beta Lorenz functions. All others based on linear model.

Table A6: Global poverty, 2012 (2011 PPP)

	$1.44			$1.78			$2			$2.50			$10		
	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)
Total	449	6.5	0.1	745	10.8	0.1	963	13.9	0.2	1,447	21.0	0.5	4,695	68.0	10.7
Total exc China	429	7.7	0.1	686	12.3	0.2	878	15.8	0.2	1,302	23.4	0.5	3,755	67.6	10.5
Regions															
EAP	29	1.4	0.0	90	4.2	0.0	135	6.3	0.1	240	11.3	0.2	1,409	66.1	9.5
ECA	8	0.8	0.0	11	1.2	0.0	14	1.5	0.0	21	2.4	0.0	212	23.7	1.2
LAC	37	6.3	0.1	50	8.4	0.2	59	10.0	0.2	81	13.5	0.4	377	63.1	8.6
MNA	0	0.1	0.0	2	0.5	0.0	4	1.0	0.0	11	2.8	0.0	230	58.1	4.9
NAM	5	1.3	0.0	6	1.7	0.0	6	1.9	0.0	8	2.3	0.0	37	10.5	0.3
SAR	119	7.2	0.1	249	15.1	0.4	355	21.5	0.7	599	36.3	1.8	1,588	96.3	49.9
SSA	251	28.1	1.5	337	37.8	2.8	390	43.7	3.8	487	54.6	6.6	843	94.6	77.2
China	20	1.5	0.0	59	4.4	0.0	85	6.3	0.1	145	10.8	0.2	939	69.5	11.6
India	94	7.6	0.1	200	16.1	0.4	288	23.3	0.7	484	39.1	1.8	1,198	96.8	47.4
Current Classifications															
HIC	7	0.6	0.0	10	0.8	0.0	11	0.9	0.0	15	1.2	0.0	160	12.5	0.3
UMIC	57	2.4	0.0	112	4.7	0.1	149	6.2	0.1	236	9.9	0.2	1,523	64.0	9.0
LMIC	170	6.8	0.1	326	13.0	0.3	453	18.0	0.6	751	29.9	1.3	2,286	91.0	37.0
LIC	215	28.9	3.1	298	40.1	5.7	350	47.2	7.9	446	60.1	14.0	726	97.8	165.4
LDC	220	27.4	2.4	307	38.1	4.4	362	45.0	6.1	464	57.7	10.9	784	97.5	132.9
Fragile States	102	28.2	1.5	129	35.7	2.6	147	40.6	3.4	178	49.1	5.7	327	90.1	63.1

Source: GrIP v2.0. Note: Current income classifications (2014); Fragile States = World Bank definition; $10 figures based on best fit of GQ or Beta Lorenz functions. All others based on linear model.

Table A7: Global poverty, 2030 (2011 PPP) projection: moderate growth scenario (IMF WEO minus 1%) and extrapolated inequality trend

	$1.44			$1.78			$2			$2.50			$10		
	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)	Mills	% popn	Pov gap (% GDP)
Total	209	2.5	0.0	344	4.1	0.0	434	5.2	0.1	693	8.3	0.1	4,613	55.5	5.1
Total exc China	209	3.0	0.0	329	4.8	0.1	405	5.9	0.1	634	9.2	0.2	4,104	59.8	6.2
Regions															
EAP	9	0.4	0.0	26	1.1	0.0	41	1.7	0.0	85	3.6	0.0	917	38.1	2.3
ECA	6	0.7	0.0	7	0.8	0.0	8	0.9	0.0	11	1.2	0.0	149	16.2	0.6
LAC	35	5.0	0.1	44	6.3	0.1	51	7.3	0.2	67	9.6	0.3	373	53.3	5.8
MNA	3	0.7	0.0	6	1.2	0.0	9	1.8	0.0	15	3.0	0.0	248	49.2	3.1
NAM	9	2.3	0.0	10	2.6	0.0	11	2.7	0.0	13	3.1	0.0	42	10.3	0.2
SAR	1	0.0	0.0	6	0.3	0.0	10	0.5	0.0	70	3.5	0.0	1,646	82.5	14.7
SSA	146	10.5	0.3	244	17.6	0.7	304	21.9	1.0	432	31.1	2.0	1,239	89.4	42.6
China	0	0.0	0.0	15	1.0	0.0	29	2.0	0.0	60	4.1	0.0	510	35.1	1.9
India	0	0.0	0.0	0	0.0	0.0	1	0.1	0.0	49	3.3	0.0	1,218	82.5	13.1
Current Classifications															
HIC	22	1.6	0.0	25	1.8	0.0	27	2.0	0.0	31	2.3	0.0	155	11.4	0.3
UMIC	38	1.4	0.0	67	2.5	0.0	90	3.4	0.0	141	5.3	0.1	1,057	39.7	2.6
LMIC	40	1.3	0.0	72	2.3	0.0	94	3.0	0.1	201	6.4	0.1	2,377	75.7	12.6
LIC	110	9.5	0.5	180	15.6	1.1	223	19.3	1.6	319	27.6	3.2	1,025	88.6	72.6
LDC	130	10.4	0.5	205	16.3	1.0	250	20.0	1.5	352	28.1	2.9	1,111	88.7	62.7
Fragile States	85	14.3	0.5	125	21.1	1.1	149	25.1	1.5	201	33.8	2.8	486	81.7	46.1

Source: GrIP v2.0. Note: Current income classifications (2014); Fragile States = World Bank definition; $10 figures based on best fit of GQ or Beta Lorenz functions. All others based on linear model.

Table A8: The geography of poverty, by different 'matched' pairs of poverty lines, 2012

	Poverty headcounts (% of global total)							Poverty headcounts (millions)					
	$1.25 (2005 PPP)	$1.44 (2011 PPP)	$1.74 (2005 PPP)	$2 (2011 PPP)	$2.17 (2005 PPP)	$2.50 (2011 PPP)		$1.25 (2005 PPP)	$1.44 (2011 PPP)	$1.74 (2005 PPP)	$2 (2011 PPP)	$2.17 (2005 PPP)	$2.50 (2011 PPP)
Total	100.0	100.0	100.0	100.0	100.0	100.0		982	449	1,715	963	2,267	1,447
East Asia and Pacific	13.4	6.5	17.0	14.0	19.2	16.6		132	29	292	135	436	240
EAP exc China	6.2	2.0	7.7	5.2	8.5	6.6		61	9	133	50	192	95
Europe and Central Asia	0.9	1.7	1.1	1.4	1.3	1.5		9	8	19	14	30	21
Latin America and Caribbean	4.7	8.3	4.1	6.2	4.3	5.6		46	37	71	59	97	81
Middle East and North Africa	0.6	0.1	1.4	0.4	2.1	0.8		6	0	25	4	47	11
North America	0.5	1.0	0.4	0.7	0.4	0.6		5	5	6	6	8	8
South Asia Region	36.4	26.6	43.2	36.8	44.5	41.4		358	119	741	355	1,010	599
SAR exc India	8.6	5.7	10.0	6.9	10.7	8.0		84	26	172	67	244	115
Sub-saharan Africa (SSA)	43.4	55.8	32.7	40.5	28.2	33.6		426	251	561	390	640	487
India	27.8	20.9	33.2	29.9	33.8	33.4		273	94	570	288	766	484
China	7.2	4.5	9.3	8.8	10.7	10.0		71	20	159	85	244	145
LICs	32.4	47.8	26.3	36.4	24.0	30.8		318	215	451	350	545	446
LMICs	54.6	37.8	58.7	47.0	58.9	51.9		536	170	1,008	453	1,335	751
LMICs minus India	26.7	16.9	25.5	17.1	25.1	18.5		263	76	438	165	568	267
UMICs	12.3	12.8	14.3	15.4	16.4	16.3		120	57	245	149	372	236
UMICs minus China	5.0	8.2	5.0	6.6	5.6	6.2		49	37	86	64	128	90
LDCs	34.9	49.0	28.5	37.6	26.1	32.1		343	220	489	362	593	464
Fragile and Conflict-Affected States (World Bank definition)	14.5	22.8	10.5	15.3	9.4	12.3		143	102	180	147	212	178

Note: The poverty lines shown are matched pairs so $1.74 in 2005PPP is the same as $2 in 2011PPP.

Table A9: Estimates of the population living between $2.50 and $10 per capita, 1990, 2012 and 2030 (projection), 2005 and 2011 PPPs

	2005 PPPs						2011 PPP					
	Millions of people			% of population			Millions of people			% of population		
	1990	2012	2030	1990	2012	2030	1990	2012	2030	1990	2012	2030
Total	1,208	2,752	3,858	23.8	40.5	46.6	1,611	3,247	3,920	31.5	47.0	47.2
Total exc China	1,034	1,905	3,312	26.2	35.0	48.5	1,340	2,453	3,470	33.7	44.1	50.6
East Asia and Pacific	299	1,179	963	17.4	55.3	40.0	457	1,169	832	26.5	54.8	34.6
EAP exc China	125	333	417	21.2	42.6	43.8	186	375	382	31.5	47.9	40.1
Europe and Central Asia	296	221	169	35.8	24.7	18.4	281	191	138	33.9	21.4	15.0
Latin America and Caribbean	199	301	318	47.0	50.8	45.4	210	296	306	48.1	49.6	43.6
Middle East and North Africa	135	200	271	59.3	66.4	57.1	143	219	233	62.7	55.3	46.2
North America	26	27	27	9.3	7.8	6.8	27	28	29	9.8	8.2	7.2
South Asia Region	160	613	1,514	14.3	37.2	75.9	335	989	1,575	29.8	59.9	79.0
SA exc India	33	162	379	13.1	39.3	73.2	74	274	407	29.1	66.5	78.5
Sub-saharan Africa	92	210	595	19.2	23.9	42.9	158	356	808	32.2	40.0	58.3
India	127	451	1,135	14.7	36.5	76.9	261	714	1,169	30.0	57.7	79.2
China	174	846	545	15.4	62.7	37.5	272	794	450	23.9	58.8	30.9
LICs	56	175	614	14.5	24.1	53.1	76	280	706	19.4	37.7	61.0
LMICs	359	1,056	2,045	20.8	42.1	65.8	646	1,535	2,175	37.5	61.1	69.3
LMICs minus India	232	605	909	27.1	47.6	55.7	385	821	1,007	45.2	64.3	60.6
UMICs	563	1,353	1,062	30.1	58.9	39.9	672	1,288	915	35.7	54.1	34.4
UMICs minus China	389	507	517	52.6	53.6	42.8	400	494	466	53.4	48.0	38.5

Source: GrIP v2.0. Note: $2.50 and $10.00 thresholds are in 2011 PPP. $2.50 figures based on linear model. $10 figures based on best fit of GQ or Beta Lorenz functions.