

Global Inequality and Global Poverty Since the Cold War

How robust is the optimistic narrative?

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Global Challenges • Working Paper Series
No. 1 • October 2016

This paper considers how the growth in global consumption since the end of the Cold War, has impacted on the co-evolution of global inequality and poverty. It is often suggested that this era of growth has led to a dramatic reduction in global poverty and to the emergence of both a new global middle class and a more equal world. We argue that this dominant and optimistic narrative on globalisation since the Cold War is considerably more methodologically fragile than it at first seems. Further, we suggest that this has implications for the UN goal to end global poverty by 2030. The fall in inequality is almost exclusively attributable to the effect that the rise of China has had on between-country inequality. Changes in global inequality across the rest of the world are much more modest. Much heralded falls in global poverty have raised the consumption of the poorest, but the extent to which that is the case depends on where one draws the global poverty line as at the lower end of the global distribution a change of just 10c can remove 100 million people from global poverty headcounts. If one takes instead the average poverty line for all countries (a more genuinely global poverty line) of \$5 per day poverty headcounts have hardly changed since the Cold War. Meanwhile, the numbers living at risk of sliding back into poverty (between \$1.90 and \$10 a day) grew by 1.6bn, compared to a rise of 1.1bn in the numbers living above this level, and around half of those living above this level saw their share of global consumption fall. We suggest therefore that the dominant or optimistic narrative, of falling poverty and an emerging 'middle class' largely free from the threat of poverty, disguises both considerable growth in the size of the 'global precariat' living in conditions that most in the

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developed world would consider to be well below 'middle class' and an erosion of the financial security of a significant proportion of those living at higher consumption levels.

1. Introduction

What has happened to global inequality and global poverty since the 'end of history', meaning the end of Cold War? Based on how the headlines of reports from international agencies are reproduced and re-presented in the media, a dominant narrative can be identified as percolating into received wisdom on development policy discourse. This is an optimist's narrative which can be summed up as suggesting that global inequality and global poverty have fallen substantially since the end of the Cold War in the late 1980s. Central to this narrative is the argument that the globalised spread of prosperity in the post-Cold War era has led to rapidly falling poverty, an evolution towards a more equal world and the emergence of a new global middle class. In this paper it is argued that this narrative on the contemporary era of globalization is considerably more methodologically fragile than it at first seems. This is significant because this dominant and optimistic narrative suggests that falling global poverty and inequality, and the rise of a global middle secure from poverty and willing and able to consume more, are a direct consequence of liberal market-oriented policies and therefore that governments need primarily to focus on economic growth and integration into the global economy and not be too much concerned with redistribution.

The purpose of this paper is to test how robust that narrative is. Of course in reality, many in international agencies have taken a more nuanced view of progress. We would thus note at the very outset that our characterization of the dominant narrative is stylized and should not be taken as absolute. We note that many others, including authors of numerous international reports such as the annual MDG monitoring reports, have recognized both that China explains much of the global progress on poverty and that the distribution of the benefits of global growth has been very uneven both between and within countries. Of course, notwithstanding this unequal distribution, any progress in raising the consumption of the poorest is to be welcomed, however modest it

may be. But, there is a danger that developing a narrative predominantly around what is happening to the poorest of the poor in global society risks marginalising, and even losing sight of, what may be a much less optimistic story if one considers what is happening when one looks at the global distribution in its entirety, and particularly among those who while not the very poorest are still very poor. The new SDG agenda also motivates such concerns by placing issues of inequality much more centrally on the global agenda.

In this paper we consider the robustness of the dominant narrative by presenting new, alternative estimates of the evolution of global inequality and global poverty. By exploring who have been the relative winners and losers from global growth since the end of the Cold War, we argue that global inequality and global poverty have changed rather less than the dominant narrative would suggest. The impression, that because global inequality is falling it is not necessary to be unduly concerned about redistribution, is misleading. This is because most of the global fall is due solely to the impact of the rise in average per-capita consumption in China on global between-country inequality. Beyond this effect, remarkably little improvement has been made to global inequality despite global consumption increasing by over 85% (in PPP terms) from 1990 to 2012. One implication of this is that, notwithstanding, there has been a substantial (1.1bn) rise in the number of people living at consumption levels where they might be considered to form a global 'middle' not at risk of sliding back into poverty. The largest rise (1.6bn people) has occurred in the group of people who whilst not below the extreme poverty line are nevertheless either very poor or still precariously at risk of sliding back into poverty.

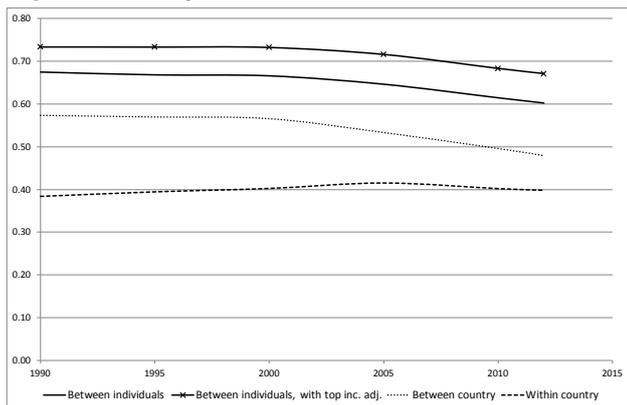
The paper is structured as follows: Sections 2 and 3 discuss respectively, trends in global inequality and global poverty since the Cold War. Section 4 concludes. The methodological approach is discussed in detail in the Annex.

2. Global inequality

To illustrate what is happening with global consumption inequality we provide here both Gini and Theil index estimates for the period from 1990

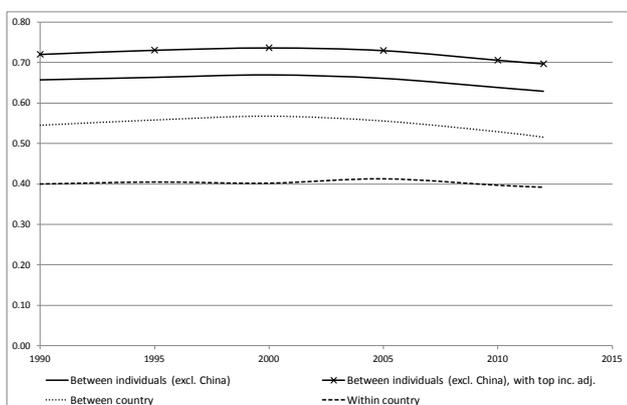
to 2012. In each case, we calculate the inequality between individuals (as per Milanovic, 2012), both with and without the top incomes adjustment described above. We also calculate separately inequality between countries and inequality within countries (population-weighted in both cases). The Gini index is the more widely used measure of inequality largely because of its close and relatively intuitive association with the Lorenz curve, however it is not readily decomposable (i.e. there is an interaction term between the within-country and between-country effects so that two estimates are not fully independent of each other). The less commonly used Theil index is fully decomposable and so may be more relevant when comparing within-country and between-country effects. Furthermore, whereas the Gini index is more sensitive to changes in the middle of the distribution the Theil index is more sensitive to changes at the extremes (see for full discussion, Cowell, 2000).

Figure 1: Global Gini coefficient (with and without top income adjustment), 1990-2012



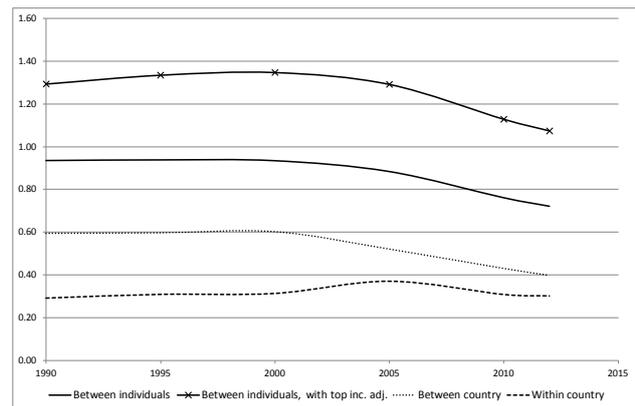
Source: GrIP v2.0

Figure 2: Global Gini coefficient excl. China (with and without top income adjustment), 1990-2012



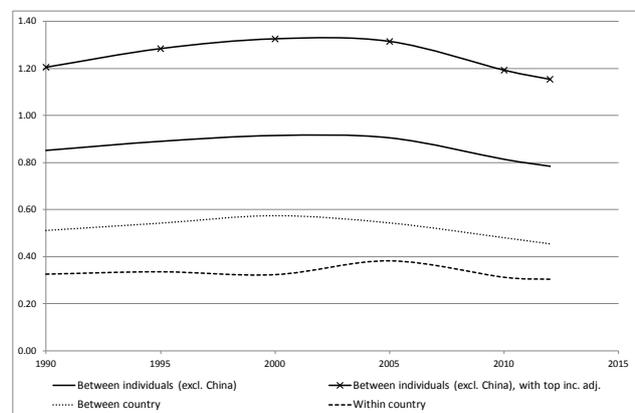
Source: GrIP v2.0

Figure 3: Global Theil coefficient (with and without top income adjustment), 1990-2012



Source: GrIP v2.0

Figure 4: Global Theil coefficient excl. China (with and without top income adjustment), 1990-2012



Source: GrIP v2.0

Figure 1 shows the global Gini indices. In view of the widely recognised dominance of China in the changing global growth, inequality and poverty situation, Figure 2 shows the Gini indices for the world excluding China. Figures 3 and 4 present the relevant Theil indices.

Between 1990 and 2000, global consumption inequality between individuals hardly changed, but from 2000 to 2012 it did start to fall. The effect is most pronounced in the Theil indices where inequality between individuals was 77% of its 2000 value. These falls are, however, solely due to changes in between-country inequality. Within-country inequality stayed effectively the same in 2012 as it was in 2000, and perhaps even slightly higher than in 1990, whilst the between-country Theil index fell to 67% of its 2000 value. As a result, and based on the Theil indices, whereas in 1990 between-country inequality accounted for 64% of global inequality,

but 2012 this figure had fallen to 55%.

The dominance of China here is clearly illustrated. Inequality between individuals has fallen since 2000 across the rest of the world but the effect is more modest. In 2012 the between-individuals Theil, excluding China, was 86% of its 2000 value. However, rising between-country inequality (excluding China) from 1990 to 2000 meant that this was only slightly lower than (93% of) 1990 values. Again, most of the fall since 2000 was due to changes in between-country inequality. Within-country inequality was little changed in 2012 being just slightly lower (94%) than it was in 2000. So, while in 1990 between-country inequality accounted for 60% of global inequality, when China is excluded, by 2012 this share had probably fallen, but only very slightly to 58%.

3. Global poverty

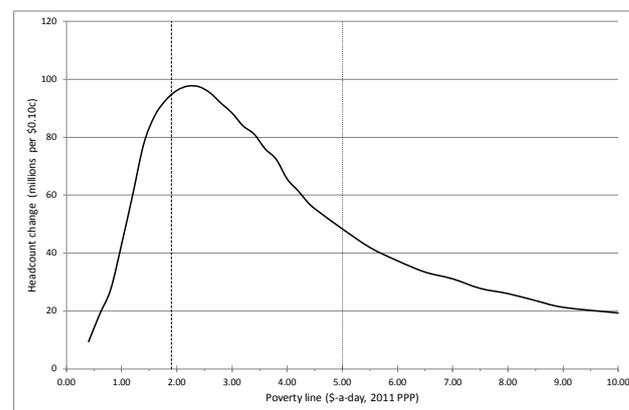
It was much heralded in the run up to the 2015 end-date for the Millennium Development Goals that substantial progress had been made in reducing global extreme poverty. The GrIP ('Gr'owth, 'I'nequality and 'P'overty model version 2.0; see Annex) analysis confirms that this is indeed the case with headcounts below the new \$1.90-a-day extreme poverty line falling by more than half, from 1.8bn in 1990 to 860mn in 2012. Yet again though the rapid rise of China has been a dominant effect. In the rest of the world extreme poverty fell by just 28%, from 1.1bn to 790mn, meaning that over 90% of global extreme poverty is now outside China.

Recalling that the \$1.90 poverty line is measured in Purchasing Power Parity dollars, it is worth observing that this represents a level of consumption that most people would consider to be closer to destitution than a reasonable subsistence consumption level. For most people living at this level the difference between living just 10cents below or 10cents above this level could hardly be considered to represent a substantively different quality of life. Nevertheless it is by crossing this threshold that people are no longer deemed to be in extreme poverty.

Figure 5 demonstrates just how sensitive global poverty headcounts are to the choice of poverty line. The \$1.90 a day line is set at a level where the

greatest density of the world's population live. In this region a difference of just 10cents in the poverty line can add or subtract almost 100mn people to global poverty headcounts. With poverty lines in this region, very modest changes in the poverty line, or in the survey and consumption data on which analyses of poverty headcounts are built, can make very substantial differences to calculated poverty headcounts. It is only when poverty lines increase to around \$5 that this sensitivity to measurement and assumption differences starts to reduce significantly.

Figure 5: Sensitivity of global poverty headcount, 2012, \$0-\$10 per day



Source: GrIP v2.0

This is not merely an intriguing statistical issue. The poverty line one adopts makes a substantial difference not only to the level and trend of global poverty observed but also influences policy makers' and activists' understanding of both where the world's 'deserving' poor actually live and the scale of the challenge (in terms of the value of the poverty gap) of ending poverty.

What then would be a reasonable global poverty line? The 'official' global poverty line has recently been rebased to \$1.90 in 2011PPP from \$1.25 in 2005PPP (Ferreira et al., 2015; Jolliffe and Prydz, 2015). While the logic of this is open to contention, as in previous adjustments (see Lahoti and Reddy, 2015 and the historic, Ravallion, 2002, 2008; Reddy and Pogge, 2002, 2005), the new line does have one underlying rationale in that it is the median of the national poverty lines in the world's low income countries (rather than merely the 15 countries that were used to estimate the earlier \$1.25 line). There is though still an arbitrary element here, because the group of LICs is still arbitrary to some extent although not totally without logic (see Sumner, 2016

for discussion). Jolliffe and Prydz (2016) provide an interesting discussion of the critiques of the international poverty line and propose a new dataset of estimates for national poverty lines in 2011PPP by inferring national poverty lines from the poverty rate to estimate national poverty lines. They note (p. 4) that the average poverty line produced from the set of 15 national poverty lines of the poorest countries is very sensitive to quality of inflation data. Mali, for example, requires 22 years of CPI data to estimate its poverty line in 2011 and in three of the 15 countries (Ghana, Malawi and Tajikistan), the CPI data was thought to be so questionable that household survey data was used to construct a temporal deflator. If CPI in World Development Indicators had been used for those three countries it would have added 20 cents to the international poverty line and 200mn poor to global poverty counts.

An alternative to the \$1.90 poverty line would be a set of lines (as Jolliffe and Prydz, 2016 propose). Candidates for higher lines would be \$2.50, \$5 and \$10. The first of these, \$2.50 is approximately 50 per cent of global median consumption in 2012 and generates a comparable headcount to estimates of multi-dimensional poverty (1.6bn in 2010, see Alkire et al., 2014), although we note that the multi-dimensional poor and the monetary poor are not necessarily the same 1.6bn people. Alkire et al. (2014) review numerous studies and argue that the monetary poor and the multidimensional poor are not synonymous. A further limitation of the \$2.50 line is that it is still in the region where poverty headcounts show maximum sensitivity to assumptions and measurement errors (cf. Figure 5). A \$2.50 line is an approximation of the average poverty lines of all developing countries (see discussion in Hoy and Sumner, 2016). The median poverty line of *all* developing countries in the Jolliffe and Prydz (2016) dataset is \$2.79 and population weighted mean is \$2.46. Raising the \$1.90 line to \$2.50 or even \$2.80 would add 600m-900m people. In short it could double the global poverty headcount.

Another possibility would be to take a poverty line of \$5 on the basis that it is both the average value of national poverty lines in all countries (see Jolliffe and Prydz, 2016) and close to global median consumption in 2012 (i.e. the level below which the poorer half of the world's population live). This would move the poverty line to a region much less

sensitive to assumptions and measurement errors thereby making it a more reliable indicator of real progress in global well-being. Both this line and the \$2.50 line also open the possibility that rather than measuring poverty in terms of headcounts it might be better to measure changes in median consumption because these are more 'distribution aware' indicators of development progress (see for discussion, Birdsall and Meyer, 2014)

A further possibility might be the substantially higher line of \$10-a-day that is associated with a permanent escape from poverty in longitudinal studies of Brazil, Mexico and Chile (López-Calva and Ortiz-Juarez, 2014) and Indonesia (Sumner et al., 2014). The \$10 poverty line is a proposal for a 'security from poverty' 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. To put some additional context on this, just 11% of OECD population and 8% of G7 population lives below this \$10 a day level.

Global poverty levels at each of these four poverty lines (\$1.90, \$2.50, \$5 and \$10) are presented as percentages of global population in Figures 6 and 7 (with and without China respectively) and as absolute numbers (millions) in Figures 8 and 9.

How robust and significant one considers the fall in global poverty to be depends on what line one uses, whether it includes China or not, and whether one considers proportion of population or total number of poor people. Figures 6 and 7 show that the falls in poverty tend to be more substantial as the poverty line falls. For example, at \$10 per day the fall in global poverty is just 10 percent over the period, falling from about 80 per cent of the world's population to about 70 per cent. If one excludes China, \$10 poverty is about the same proportion of population in 2012 as it was in 1990. However, at \$1.90 or \$2.50 the fall is more substantial, respectively from 35 percent and 45 per cent of world population in 1990 to just over 10 and 20 per cent in 2012. Again, without China the falls are much less impressive.

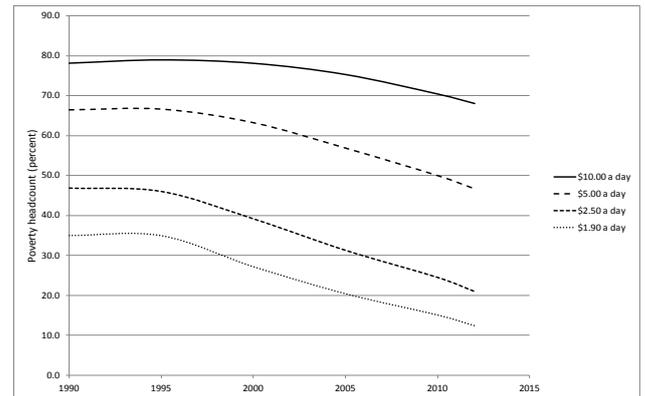
When one considers actual absolute numbers of people by each line, the record on poverty reduction further weakens drastically. Figures 8 and 9 show that even including China, \$10 poverty has risen

from 4 billion people to close to 5 billion people while \$5 poverty is about the same as it was in 1990 (3.4bn in 1990, 3.2bn in 2012). Poverty at the two lowest lines has fallen more convincingly if one includes China. However, once again the exclusion of China reveals patterns counter to the dominant narrative. For example, at the new global poverty line of \$1.90 poverty has fallen from just over 1 billion people to just under one billion but at a slightly higher line which is the median for all developing countries, \$2.5 per day poverty only fell below 1990 levels in 2010 and is now only slightly below those levels.

If one were to consider that the definition of being ‘middle class’ is to be sufficiently well off that you are secure from the risk of sliding into poverty (and assume that that is achieved at consumption levels above \$10 a day) then since 1990 an additional 1.1bn people have been added to this group, so there certainly has been a significant increase in the size of the global ‘middle class’. However, in the same time the number living above the extreme (\$1.9) poverty line but below the (\$10) secure-from-poverty line has increased by 1.6bn. This group would include many people one might consider to still be very poor (living only a little above the extreme poverty line) plus those living precariously at risk of sliding back into poverty. Arguably, this represents a significant challenge to the dominant narrative.

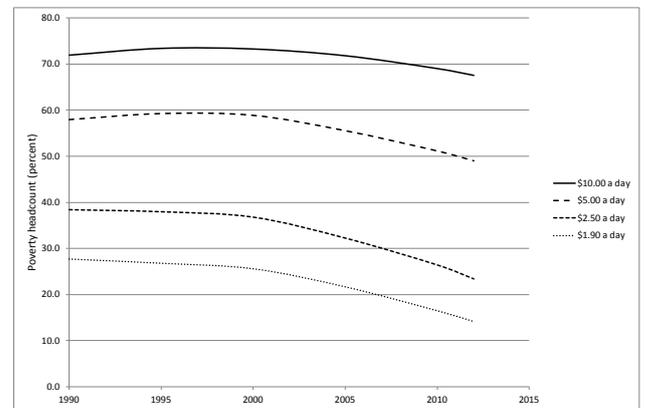
The total poverty gap gives a consistent picture to the above discussion (see Figures 10 and 11). The global poverty gap at \$10 rose over the last two decades but is now back to the point it was in 1990. At \$5 per day the total poverty gap fell by approximately a third in value. The fall in the value of the total poverty gap at the lower lines are more substantial: at \$1.90 and \$2.50 per day the total poverty gap fell in 2012 respectively to 38 per cent and 47 per cent of its value in 1990 (\$424bn to \$164bn at \$1.90 and \$888bn to \$417bn at \$2.50). However, when China is excluded the \$10 poverty gap has risen from \$7150bn in 1990 to \$8383bn in 2012. And the total poverty gap excluding China at the \$5 poverty line is about the same level as 1990 but the total poverty gap excluding China at \$1.90 and \$2.50 has fallen from \$258bn to \$155bn and from \$549bn to \$385bn respectively.

Figure 6: Global poverty headcount (% of population), 1990-2012



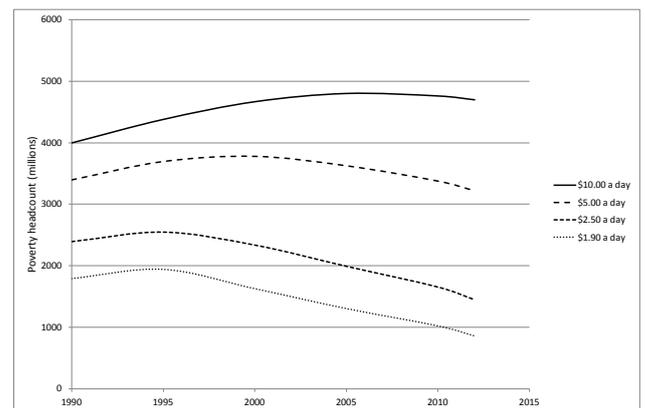
Source: GrIP v2.0

Figure 7: Global poverty headcount (% of population) excluding China, 1990-2012



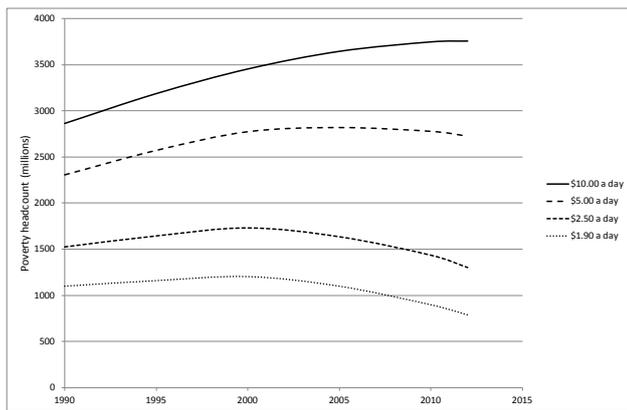
Source: GrIP v2.0

Figure 8: Global poverty headcount (millions), 1990-2012



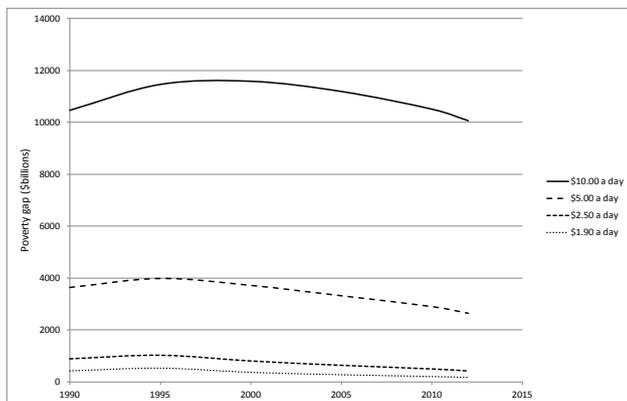
Source: GrIP v2.0

Figure 9: Global poverty headcount (millions) excluding China, 1990-2012



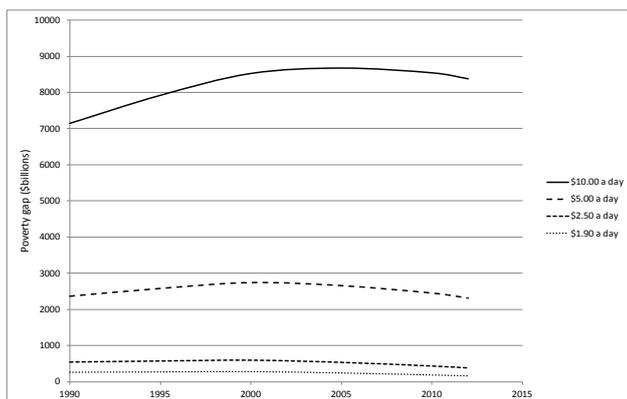
Source: GrIP v2.0

Figure 10: Global poverty gap, 1990-2012 (US\$bn, 2011 PPP)



Source: GrIP v2.0

Figure 11: Global poverty gap, excluding China, 1990-2012 (US\$bn, 2011 PPP)



Source: GrIP v2.0

By focusing rather narrowly on the global success at reducing poverty against the very low extreme poverty line and on the success at lifting many

people into a condition where they are newly secure from poverty, the dominant narrative rather obscures that in terms of absolute numbers the biggest change globally has been the increase in the size of the global poor and 'precariat' living between \$1.90 and \$10 a day.

We should make clear that we are not dismissive of the progress that evidently has been made in terms of lowering poverty at the extreme, as well as at the \$2.50 poverty lines (including when excluding China). Rather we are noting that the decline is of course welcome but really rather modest. The real contention is of course whether anyone can live on \$1.90 and if that does provide the capacity to purchase minimum food requirements. Because the global population is very dense at around that level, the fact that the use of official inflation data would raise this minimum poverty line only slightly but would add 200m people to the poor count is in itself sobering. In short, we are not saying the world should not care about the poorest. We are saying the world is not even counting some of the poorest.

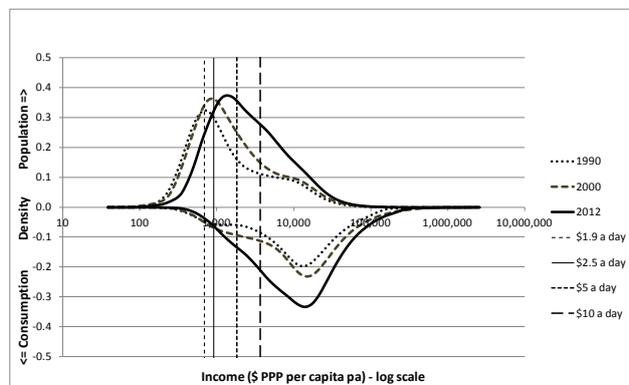
In sum, we have argued thus far that changes in global inequality are modest and largely due to between, not within, country effects, and that the between-country changes are so dominated by China's rise that the fall in global inequality largely evaporates once China is excluded from analysis. We also find that very low poverty lines (such as \$1.90 a day) are so hypersensitive to small differences in the data that they create the impression that progress in the global battle against poverty has been more significant than it appears when poverty lines that are both more globally representative and less sensitive to measurement errors (such as \$5 a day) are applied. And we suggest that, far from witnessing the simplistic emergence of a new 'middle class', most of the world's burgeoning middle is highly precarious in the sense that they live a considerable distance away from the consumption levels associated with permanent escape from poverty in longitudinal surveys in developing countries.

The global distribution curve

This implies that, rather than focusing on overall economic growth and extreme poverty headcounts, closer attention needs to be paid the distribution of the benefits of growth. Figures 10 to 12 present global density curves that illustrate the distribution

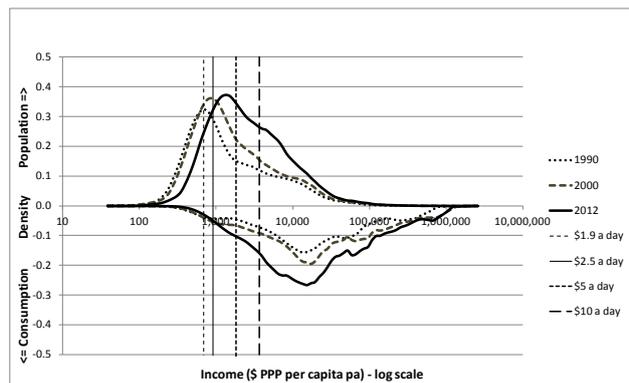
of population (plotted positively on the y-axis) and consumption (plotted negatively on the y-axis) across the full range of global consumption. Areas beneath curves are standardised relative to the 2012 population and consumption totals, respectively. This means that the change in area (between each curve and the x-axis) between 1990 and 2012 (say) is proportional to the change in the number of people living at any particular consumption level (above the x-axis) or to the change aggregate consumption of the people living at a particular consumption level (below the x-axis). Figure 10 presents the figures without the top incomes adjustment. Figure 11 includes the top incomes adjustment.

Figure 10: Global density curves, 1990, 2000 and 2012 without top income adjustment



Source: GrIP v2.0

Figure 11: Global density curves, 1990, 2000 and 2012 with top income adjustment

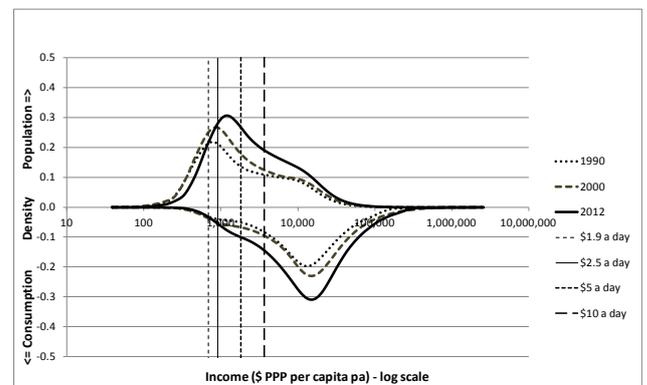


Source: GrIP v2.0

What can be clearly seen is the growth in the global middle, evidenced by the filling out of the concavity in the population curve above \$2.5 a day since 1990. This concavity, which was even deeper in the 1980s, led Quah (1996) to describe us as living in a ‘twin-peak’ world. It remains to be seen, however, whether the current situation represents a permanent end

to that twin-peak rich-poor divide or whether it indicates merely a transition to the emergence of a new divide. For example, the incipient return of the concavity between \$5 and \$10 a day when top incomes are added in might be a precursor of the return of such a divide. It is notable also that when China is removed (Figure 12) the concavity persists still in 2012, indicating that its current absence at the global level may merely be evidence of China’s progression from the lower under-developed peak to a higher-developed location rather than an indicator of any more fundamental changes in the fairness of the global economy.

Figure 12: Global density curves (excluding China), 1990, 2000 and 2012 without top income adjustment



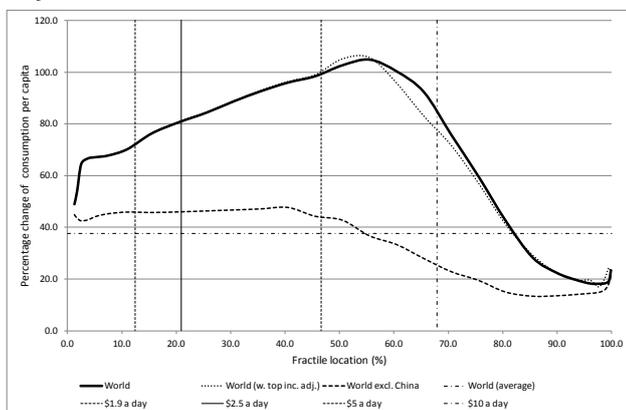
Source: GrIP v2.0

The curves also clearly illustrate who benefitted most from global consumption growth. Between 1990 and 2012 global consumption increased by 90%, with most of that growth occurring after 2000; reminding us that despite the financial crisis of the late 2000s the world is still consuming a lot more now than it was at the end of the Cold War. Of that growth, four-fifths went to those who in 2012 were consuming more than \$10 a day. The remaining one-fifth (the figure falls to 15% if top incomes are included) went to the more than two-thirds of the world’s population who exist precariously on less than \$10 a day.

Growth incidence curves provide further insight into the winners and losers from global growth since 1990. Figure 13 shows how people across the global consumption spectrum (from the poorest to the richest fractiles) have benefited in relative terms (i.e. percentage change in consumption from 1990 levels). Again the dominance of China is starkly revealed. With China included, people living in

2012 on between \$2.5 and \$10 a day had typically seen their per capita consumption levels rise, in percentage terms, by twice the global average or more. However, once China is removed the picture becomes very different with those living on less than \$5 a day seeing their relative consumption rise much less, albeit nevertheless broadly in line with the global average (in percentage terms). Typically, most of those on higher consumption levels have seen their relative consumption rise more slowly than the global average so that *in relative terms* it is both the global precariat (those between \$1.90 and \$10 a day) and most of what might be called the 'securiat' (those above \$10 a day with the possible exclusion of the very richest fractile) who have seen their consumption rise more slowly than global averages.

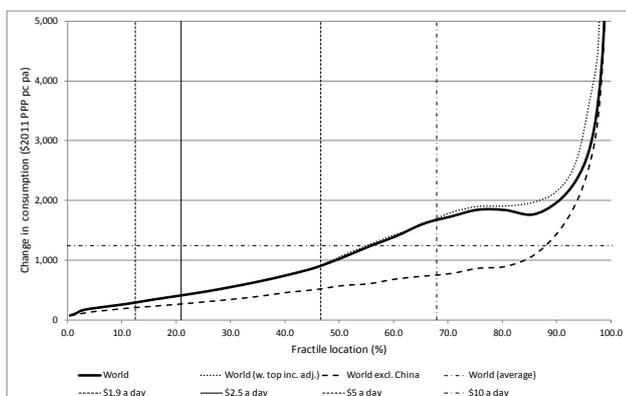
Figure 13: Growth incidence curve (relative benefits), with and without top incomes adjustment, 1990-2012



Source: GrIP v2.0.

Note: fractile locations of \$-a-day lines are based on world without top income adjustment.

Figure 14: Growth incidence curve (absolute benefits), with and without top incomes adjustment, 1990-2012



Source: GrIP v2.0.

Note: fractile locations of \$-a-day lines are based on world without top income adjustment.

In this (relative) sense the distribution of global growth since 1990 could be seen as having been generally pro-poor, even when China is excluded. However it must be remembered that these relative consumption rises represent percentage changes on already very low consumption levels. When absolute consumption levels are considered the picture is, of course, very different (Figure 14). Here it is the richest 40% who have seen their per capita consumption rise, in \$-value, by more than the global average. And if China is removed it is only the richest 10% who have benefitted by more than the global average.

Overall then, analysis of the distribution of the absolute benefits of global growth hardly seems to point to the emergence, within developing economies, of a burgeoning 'middle class'. Certainly, there has been a significant growth (1.1bn) in the number living secure from sliding back into poverty. There are now 2.2bn people in this 'global securiat' living above the \$10 a day level. The 400mn of them who live in China have benefitted enormously, as have the 700mn who constitute the world's richest decile. But the remaining 1.1bn of them have seen their consumption grow in absolute terms by less than the global average and in relative terms by much less than (around 50% of) the global average since 1990.

In sum, contrary to the dominant narrative, therefore, far from witnessing a simplistic end to poverty and the rise of a global 'middle class' we may well be witnessing something much more complex. A key dynamic is, unsurprisingly, the rapid transition of China on a trajectory to becoming a highly developed economy. This 'success story' however can mask the fact that since 1990 the largest change in headcounts has been in the number of people globally living either in poverty, albeit not extreme poverty, or at risk of sliding back into poverty. Almost 80% of people in this group live outside China but the precarious nature of their existence is largely absent from the dominant narrative. And at higher consumption levels, among those secure from poverty, there is evidence that, other than for the world's top decile and for the 400mn people in China who are newly above the \$10 a day consumption level, the distribution of global growth since 1990 has seen them benefit by less than global averages in both absolute and relative terms.

Overall then, once the ‘China effect’ is carefully disaggregated from the analysis, what emerges is a picture of a world in which remarkably little has changed in terms of global inequality. Meanwhile, much heralded falls in extreme poverty seem both to overstate the world’s success in addressing global poverty, broadly defined, and to be rather unreliable due to their sensitivity to measurement and assumption differences. This risks obscuring the very significant increase in the number of people in the world who, while above the extreme poverty line, are either still poor or at risk of sliding back into poverty. At higher consumption levels, among those living more securely (the ‘global securiat’ above \$10 a day) around half of them, those in the global top decile and those now living in China on more than \$10 a day, have seen their consumption rise, in absolute terms, well above global averages. But for the rest of the ‘global securiat,’ on average they have seen their share of global consumption eroded both in absolute and relative terms. The dominant narrative therefore risks obscuring a far less promising picture, of a burgeoning global middle where well-being and financial security seem precarious or increasingly insecure.

4. Conclusions

In conclusion, we can make three observations on how global inequality and global poverty have changed since the end of the Cold War. First, a much heralded fall in global inequality is largely explicable with reference to the impact of China’s rise on between-country inequality. When China is excluded, changes in aggregate inequality across the world are much more modest with inequality levels in 2012 being marginally lower than in 1990. Throughout this entire period within-country inequality has, overall, been remarkably constant – as some countries have become less equal, others have become more so. In short, in the last 25 years, falls in total global inequality, and in global between-country inequality are almost all attributable to rising prosperity in China.

Second, while it is the case that falls in global poverty look impressive at \$1.90 or \$2.50 those falls look less convincing at \$5 and \$10. And even the falls at the lower poverty lines start to look unimpressive if one looks at the rest of the world outside China and considers absolute numbers of people under each line. In any event, the fact that

global poverty counts are so hypersensitive at the lower poverty lines ought to be reason enough to use higher lines that are less sensitive to measurement errors and differences in analysis assumptions. To reiterate we are not dismissing the raising of the consumption of the very poorest. Rather we are noting that progress is rather modest and that the lowest poverty lines actually cut off some of the poorest whose consumption may be just a few cents higher than these extreme levels. We note also that the global poverty line ought to be 20 cents higher if national CPI data were used, or even 60 cents or 90 cents higher if one took the estimated value of the average poverty line of all developing countries. We would thus argue that multiple poverty lines are more useful than fixating excessively on the \$1.90, and especially so given that recent reductions in the number of extreme poor arise because a large number of people have merely moved from just below that line to just above it. Whether they are still ‘poor’ depends on whether one accepts that someone can live on the average poverty line of the world’s 15 poorest countries in 2005, with those national poverty lines adjusted by national inflation, minus 20 cents (due to the three countries where CPI data is too poor to use). Higher lines would be better in the sense of generating poverty counts that are less hyper-sensitive to small variations in the value of the line, although only when those poverty lines have the logic of being the average for all countries (a truly global poverty line) or the consumption needed to permanently escape poverty. We are not saying higher poverty lines are better for the sake of it but rather that higher poverty lines that have a conceptual logic would seem to be stronger proxies for global poverty.

Finally, certainly the twin peak world of the 1980s has softened and a new middle has emerged. However, this does not seem to herald the arrival of a global middle class safe from poverty. Global growth has increased the numbers of people living above a consumption line associated with permanent escape from poverty, but the largest increase in numbers has been in the burgeoning precariat who live above the lower poverty lines of \$1.90 or \$2.50 per day but still a long distance from a consumption line associated with security from falling back in to poverty in the future of \$10 per day. And among those at higher consumption levels, other than for the newly rich in China and the world’s richest decile, most of these people have seen their financial security eroded.

In sum, we would argue that the narrative that economic growth since the Cold War has led to a new age of falling global inequality and poverty is considerably more fragile than it at first seems. We suggest instead that the dominant narrative, of falling poverty and an emerging 'middle class' largely free from the threat of poverty, disguises both considerable growth in the size of the 'global precariat' living in conditions that most in the developed world would consider to be well below 'middle class', and an erosion of the financial security of a significant proportion of those living at higher consumption levels. Both the exclusion of China and the adoption of less extreme (and less hypersensitive) poverty lines reveal how the way that global poverty and global inequality are measured can distort our understanding of the complex changes in inequality between and within nations at a global level. Recognising and exposing the impact of these issues gives a rather less optimistic view of the impact of economic growth since the end of the Cold War on global inequality and poverty.

Annex: Methodological approach

This paper makes use of a custom-built model of growth, inequality and poverty. Henceforth this model is referred to as the GrIP ('Gr'owth, 'I'nequality and 'P'overty) model (version 2.0, 2015). For an earlier version of the model (GrIP model v1.0) see Edward and Sumner (2014). The GrIP model includes extensive functionality to test the sensitivity of results to different datasets and different assumptions about how to handle the data. The descriptions provided in this paper relate only to the model as configured for the analysis presented in this paper and should not be assumed to apply to the way the model is configured in other published analyses based on the GrIP model. For this paper we have configured GrIP to align with the overall approach used by the World Bank when producing poverty estimates through PovcalNet. This means that our approach here is to combine survey distributions with survey (rather than national account) means and to rely wherever possible on data in Povcal in preference to other sources, on the basis that data in Povcal has already been selected for reliability and robustness through scrutiny of available competing survey datasets. This does not mean that GrIP replicates Povcal calculations because there are a number of additional adjustments in GrIP, rather that they are included to develop a truly global distribution that can allow reasonable comparison across time periods. Principal among these are: the use of other sources and methods to add in estimates for countries where data is not available in Povcal; the way that underlying survey data is interpolated between surveys; and the use of changes in national account data to inform scaling of survey means (mean per capita consumption) between surveys. We describe these adjustments briefly below but, because they were originally introduced in earlier versions of GrIP after careful consideration and evaluation, we would refer the reading to earlier discussions (such as Edward and Sumner, 2014) where much more detail can be found. In this paper we also introduce two new additional measures namely the adjustment of income-based surveys to align more consistently with consumption-based surveys, and an adjustment to estimate the possible impact of top income earners who are often missed from surveys. These are new adjustments thus we discuss them in more detail.

The core approach in the GrIP model is to take for

each country the distribution (quintile and decile) data 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. Having identified for each country the number of people living at each consumption level, the GrIP model then aggregates these to build a global distribution of how many people live, and how much those people consume, at every consumption level from the poorest to the richest in the world and a wide variety of sub-global aggregations are also readily produced. These aggregations are then interrogated to investigate issues such as poverty levels, trends in inequality and who are the absolute or relative winners and losers from global growth.

Table A1 Core components of the GrIP v2.0 model and data sources

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

Table A1 shows the data sources for the GrIP v2.0. As table A1 shows the GrIP v2.0 is built from data in the World Bank's PovcalNet, World Development Indicators, UNU WIDER's WIID3b and UNPD World Population Prospects.

Throughout this paper we use the new PPP rates (for 2011). While we acknowledge that significant uncertainties remain concerning this data (for a discussion of these issues see Edward and Sumner, 2015), nevertheless we use them because we recognise that they are generally thought to be the best available data and superior to previous PPP data (Deaton and Aten, 2014).

Distributions (quintile and upper and lower decile data) are taken (in this order of preference) from

PovcalNet, World Development Indicators or the UNU WIID database. Survey data has improved considerably in recent years and notably there are now many more surveys to draw data from and far fewer ‘gaps’ for specific countries. However, there are still some significant gaps in the data. Surveys do not take place annually so, in the GrIP model, distributions for intermediate years, between-surveys are calculated by interpolation, while in years subsequent to the most recent survey the distribution is assumed to remain unchanged from that survey. We note also that the distribution data can be derived at either the individual level or the household level. This is an outcome of the original survey design and so it is difficult to adjust for in subsequent analysis. As is the case for most other studies we do not attempt to adjust for this difference but note that household surveys will inevitably understate national inequality to some extent as they do not include intra-household inequality. To ensure optimum coverage of the global population, where a country has no surveys, or the gaps between surveys are too great to allow reliable interpolation, the GrIP model ‘fills’ a country’s missing distributions with the (not population-weighted) average distribution from all other countries in the same region and income group (in contrast, the World Bank poverty estimates are based on ‘filling’ with regional averages regardless of average income. See for details Ferreira et al., 2015).

The GrIP v2.0 model (as configured for this paper) calculates the number of people in each country at each different consumption level by combining survey distributions with measures of mean per capita consumption. The model then disaggregates these national populations into globally standard ‘\$ per capita’ brackets, thereby avoiding introducing the distortions of approaches, such as Bhalla’s simple accounting procedure (Bhalla, 2002; Hillebrand, 2008) where by disaggregating to percentiles some large step-change distortions are introduced in the later global aggregation at points where percentiles from the very largest countries (such as India and China where each percentile currently includes well over 10 million people) are added back into the global distribution. In earlier versions of the GrIP model a linear distribution algorithm was used that accurately replicates the consumption level in each fractile in the source data. This works well in the lower fractiles where poverty headcounts are estimated, but at the higher end of the distribution (typically the upper quintile: the highest consuming

20%). While it accurately reproduces 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. In the GrIP v2.0 model the generalised quadratic (GQ) algorithm, as described by Datt (1998), has also been incorporated. Arguably, this algorithm can replicate better the inequality distribution within the highest deciles so, in this paper, we use the GQ algorithm throughout.

Changes in consumption mean between survey years are derived by combining year-on-year changes in Household Final Consumption Expenditure (HFCE) from national account (NA) data with changes in the country-specific ratio of HFCE per capita means and survey-based means (the NA/S ratio) in survey years. We have previously used GrIP to explore the impact of different approaches and assumptions in the use of the available data. For example, Edward and Sumner (2014) compare NA and survey means with reference to global and regional poverty estimates and discuss how the use of NA means makes substantial difference to estimates of global poverty and global inequality. Edward and Sumner (2015) compare 2005 and 2011 PPPs. We do this here to remain comparable to the reference literature (such as poverty estimates published by the World Bank). Where reliable survey means are not available (for example when filling countries for which there is no survey data or when using distributions from WDI where survey means are not provided), an appropriate survey mean is estimated for that country based on its average per capita consumption level. To do this we use the following relationship, derived from the consumption surveys in PovcalNet:

$$\left(\frac{NA}{S}\right)_{consumption} = (HFCE \text{ per capita})^{\alpha}$$

The question of how national account means correlate with survey means has long been considered problematic, see for example: (Altimir, 1987; Mejía and Vos, 1997; Ravallion, 2003; Deaton, 2001). Karshenas (2003) identifies that a systemic relationship appears to exist between NA and survey means but that this is subject to considerable variation between countries. For this reason in GrIP we use country-specific NA/S ratios wherever possible and include estimates generalised from global data only where necessary. A fuller description of our approach has been provided

elsewhere (Edward, 2006; Edward and Sumner, 2014) although recent increases in available data mean that in GrIP v2.0 we have improved the method of estimation by introducing the regression relationship described here. We estimate that $\alpha = 0.052$. Table A2 illustrates how by first incorporating survey data from sources other than PovcalNet and then filling estimates for countries without usable survey data, the GrIP model incrementally builds a global model of consumption distribution.

Table A2 Coverage of population and HFCE in GrIP v2.0 before and after filling (2011PPP)

	2011 PPP		
	No. of countries	Global population included (%)	Global HFCE included (%)
<i>PovcalNet coverage</i>			
1990	110	88.1	82.5
2012	111	86.9	77.3
<i>Process 1: additional distributions from WDI and WIID</i>			
1990	130	94.0	97.3
2012	145	94.6	96.5
<i>Process 2: filling with estimates for countries with no survey data</i>			
1990	175	96.8	100.6
2012	192	98.1	100.8

Source: GrIP v2.0. Note: Process 2 figures for HFCE coverage exceed 100 per cent because the WDI 2011 PPP figure for global total HFCE is actually slightly lower than the sum of the HFCE figures for the individual countries.

GrIP v2.0 incorporates two important developments compared to v1.0. These are: the introduction of an adjustment of income-based surveys to render them more comparable to consumption-based surveys; and an adjustment to estimate the effect of top

income earners who are often missed from national consumption or income surveys.

It is widely recognised that there is likely to be a systematic difference between measures of consumption distribution and those of income distribution. In World Bank calculations where there has been the option of choosing either an income or consumption-based set of measures (i.e. distribution data and matching mean) there has been a preference for using consumption-based measures. While an argument can be made that this is because poverty-lines are nominally translatable into actual consumption (of food, shelter etc) and so consumption levels are a better reflection of an individual's welfare, the more compelling explanation is generally that, among those at the bottom of the distribution, measures of income can be less reliable due to under-reporting or mis-recognition of informal incomes or the value of self-produced incomes (such as directly consumed agricultural produce). For these sorts of reasons, World Bank analysts have tended to prefer using consumption measures (see discussion of Lipton and Ravallion, 1995) and in the spirit of mirroring (but not directly replicating) the Povcal approach, we do likewise here.

Until recently, however, most analyses of global poverty and inequality (including, but not only, earlier versions of the GrIP model) have not made any adjustment for systemic differences between consumption-based and income-based measures, opting instead merely to use consumption-based measures whenever a direct choice is available. A key pragmatic reason why this adjustment has been often omitted is because within PovcalNet there is only a rather limited set of countries where equivalent data (i.e. from the same country and same year) is provided on both an income and a consumption basis, and from which therefore a suitable comparison and adjustment could be developed. This comparison has now become more feasible with the latest update of WIID, which contains a much larger number of paired income and consumption surveys, so we are now able to introduce this adjustment.

The paper of Deininger and Squire (1996) was one of the first to estimate adjustments for consumption to income measures. 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. More recently, and using the latest WIID, Lahoti et al. (2014) identify 120 instances in the WIID data set where there are both consumption and income distributions reported by the same statistical agency in the same year for a country. From these they estimate conversion factors to transform quintile data based on income metrics to consumption-equivalent values. We have not repeated their calculations; instead, we have used the more limited set of PovcalNet data to develop comparable estimates (see Table A3). In Table A3, estimate 'a' is derived from pairs of income and consumption surveys made in the same year. Estimate 'b' pairs income surveys with consumption surveys made within one year of each other.

Despite using a much more limited data set, these estimates broadly confirm figures from Lahoti et al. (2014) 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 have adopted the Lahoti et al. adjustments (because they are derived from a much larger data set) and 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).

Table A3 Conversion multipliers for adjusting income survey data

	Estimate 'a'	Estimate 'b'	Estimate 'c'
	Source: PovcalNet	Source: PovcalNet	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*

Note: * = data estimated by authors. Source: Authors' estimates based on GrIP v2.0 and Lahoti et al. (2014).

Applying these multipliers to a country's decile/quintile figures (if the original data is based on income measures) adjusts the income-based distributions in the model to make them more comparable to consumption-based measures. However, these systemic differences are not limited to the distribution curves. There is also a systematic difference between income-based means and consumption-based means with income measured in the surveys being on average larger than consumption measured in the surveys (see, for example, Karshenas, 2003, 691) so that an adjustment also needs to be made to reduce the income aggregate (or mean) to render it comparable to consumption aggregates. We address this by revisiting the calculation of the NA/S to HFCE relationship (discussed above) but this time we use only income surveys (whereas previously it was calculated using only consumption surveys). This allows us to use all the surveys in PovcalNet (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 paired income and consumption surveys) to estimate a relationship between consumption and income based NA/S ratios as follows (We estimate the factor income based:

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

All results presented in this paper include this adjustment of income surveys to consumption equivalents. Although intuitively one would expect income-based means to be larger than consumption-based means, the reasons are complex and are different depending, for example, on where

an individual is on the distribution. For further discussion see Deaton (2005) who analyses the issue in detail and Altimir (1987) who discusses some of the complexity inherent to different approaches to income surveys and the difficulties encountered in trying to disaggregate and account for individual elements of this complexity. For these reasons, here we follow Lahoti et al. (2014) in deriving generalised adjustment factors from the aggregated data that can be applied to bring income-based measures more closely into alignment with consumption-based measures than has been standard practice in the past.

It has long been recognised that the consumption (or income) of the top of the distribution is not well captured in the household survey data (see for discussion, Korinek et al., 2006). More recently, data from the Paris School of Economics' *Top Incomes Project* (TIP) (which is based on taxation data, see Alvaredo et al., 2014) has drawn attention to concerns that the 'missing' share of the distribution that accrues to the top percentiles can be substantial. Various 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 HFCE data are entirely due to underreporting by the richest (e.g. Lakner and Milanovic, 2013). Others (e.g. Anand and Segal, 2015) develop assumptions on the missing 'top incomes' by drawing on the TIP data produced by Alvaredo et al. (2014). More commonly, the issue has been expediently ignored on the basis that if one is only concerned with estimating poverty levels then the problem of 'missing' consumption of the richest is largely incidental because it occurs at the top of the country distributions and so generally well above the poverty lines under consideration.

However, the issue could make a difference when considering the entire global consumption distribution, as we do here, so in the GrIP v2.0 model we use the TIP dataset to develop a relationship between the share of the top decile (10%) from national distribution surveys and the reported shares in TIP (from tax data) of the top fractiles, i.e. the top decile (10%), ventile (5%) and percentile (1%). We use the most recent surveys from each country in TIP where there is both a matching income-based survey in PovcalNet and data in TIP. This yields 17 datapoints (all of which are from high-income countries) from which we derive linear relationships to estimate- the unadjusted top decile

share in the survey distributions in GrIP, and revised shares of the top decile, ventile and percentile in each country. The data in GrIP is then adjusted by adding consumption appropriately across the top decile in every country to bring the shares of the top fractiles in line with these estimated revised shares. Recognising, however, that the HFCE figure probably provides an upper limit to the amount of consumption that should reasonably be added, we cap the adjustment so that the total consumption for each country does not exceed its HFCE total. There are some exceptions to this where the PovcalNet survey mean already implies a consumption level higher than the HFCE total. In those cases we reason that the HFCE figures must be questionable and so do not apply the cap.

This adjustment does not have any impact on the absolute consumption of those below the top decile in each country. It simply adds consumption to the top 10 per cent in each country and distributes this so as to reproduce, in GrIP's consumption-based analysis, the same share of the distribution that the TIP database identifies for and among the top 10 per cent. In practice, however, the share of the rich in a consumption survey will probably be lower than this as rich people tend not to save more and consume less, as a proportion of their annual income, than do the poor. For these reasons we consider that the top incomes adjustment in GrIP may overstate the share of consumption that is accounted for by the richest decile in each country. We therefore present estimates with and without top income adjustment on the basis that such estimates might be best viewed as the range of possibilities not that one or the other is more 'correct'.

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